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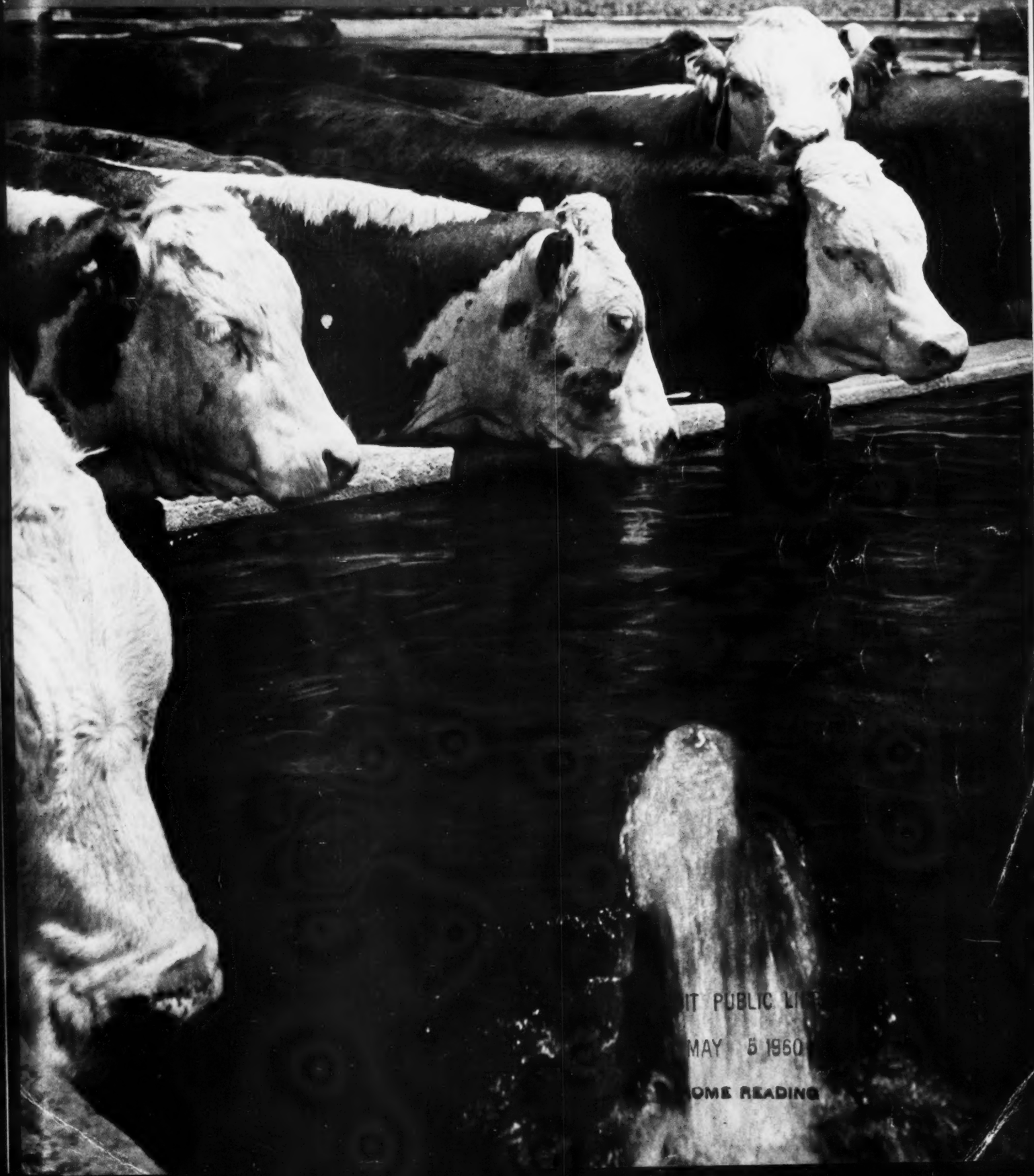
The Farm QUARTERLY

New Ways with Hay | compressed bales wafers - pellets

Automated Feedlots



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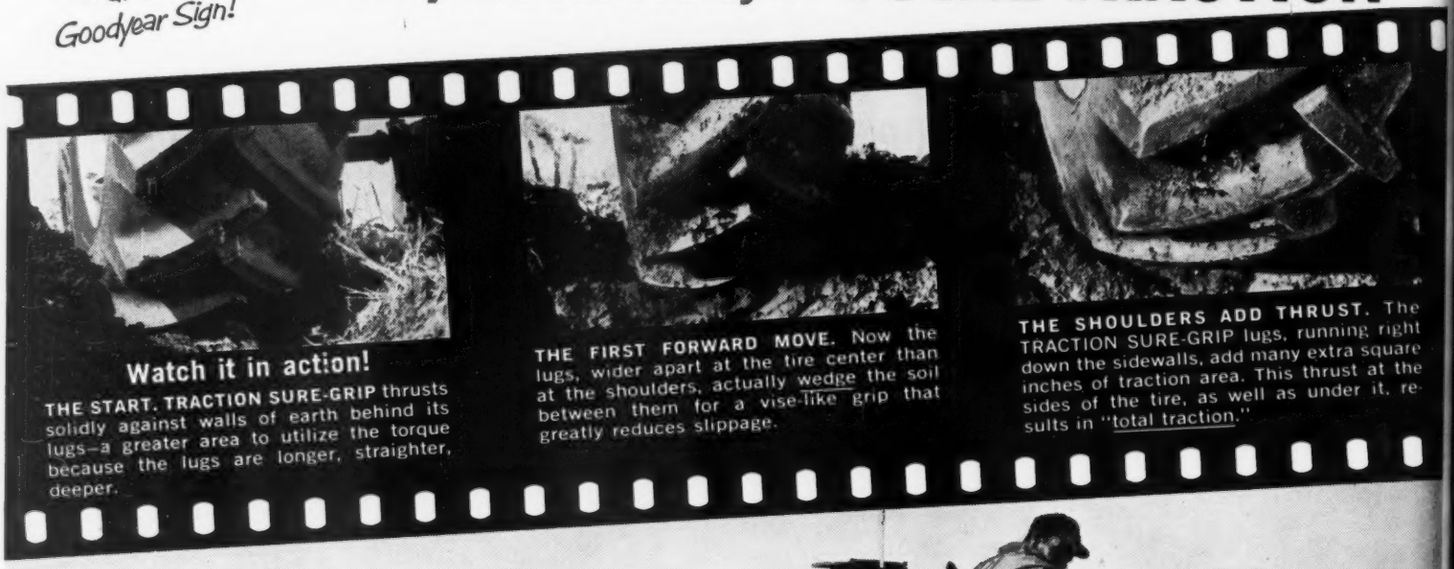
OME READING

GOODYEAR TIRES

"They treat you fine at the Goodyear Sign!"

only with TRACTION SURE-GRIP

the peak efficiency of "TOTAL TRACTION"



Watch it in action!

THE START. TRACTION SURE-GRIP thrusts solidly against walls of earth behind its lugs—a greater area to utilize the torque because the lugs are longer, straighter, deeper.

THE FIRST FORWARD MOVE. Now the lugs, wider apart at the tire center than at the shoulders, actually wedge the soil between them for a vise-like grip that greatly reduces slippage.

THE SHOULDERS ADD THRUST. The TRACTION SURE-GRIP lugs, running right down the sidewalls, add many extra square inches of traction area. This thrust at the sides of the tire, as well as under it, results in "total traction."

Above you actually *see* why TRACTION SURE-GRIP costs less to own—how it produces more travel per wheel turn, does more work on less fuel.

And it's built for more years of trouble-free wear, too. The reason: TRACTION SURE-GRIP is made with mighty 3-T processed Cord—triple-tempered by Goodyear's exclusive process involving Tension, Temperature and Time. It results in the strongest known safeguard against bruises, buckle breaks, cracks.

TRACTION SURE-GRIP gives you *more tire per dollar than any other made.*

ON-THE-FARM SERVICE. Your Goodyear dealer is equipped to deliver, mount, fill or repair tractor tires right on the farm. He'll supply free loaners while your tires are being repaired or retreaded. He'll give you expert help on tire maintenance. Call him in to quote you on his extra-liberal trade-in tire allowances! Goodyear, Farm Tire Dept., Akron 16, Ohio.

Tops in front tire performance

NEW SUPER-RIB

3 ribs for better steering, better flotation, better wear!

BUY OR SPECIFY FARM TIRES BY

GOODYEAR

Sure-Grip—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

MORE FARMERS PREFER GOODYEAR TRACTOR TIRES THAN ANY OTHER KIND

GANG-WAY TO MAKE HAY. NEW IDEA Hay Conditioner operating in tandem with NEW IDEA semi-mounted mower lets you mow and condition in one time over. Saves manpower. Saves time. Saves fuel.

NEW IDEA makes the first true HAY CONDITIONER

Schematic cross section shows simple, efficient pick-up and feed-through with New Idea fluted steel and rubber roll combination. Deflector can be raised or lowered to control fluffing!

PROFIT CALCULATOR

Shows how New Idea conditioner pays its own way right away! **Get Calculator free** by mailing literature request coupon today!

Not a crimper, not a crusher, NEW IDEA combines the best aspects of both methods for faster curing and leafier hay!

Exclusive New Idea design teams big, self-cleaning rubber crushing roll with fluted steel pick-up roll with tapered end. The result — faster drying than with a crimper. More aggressive, plug-free feed-through than with two smooth rolls. Less leaf loss and less damage to tender leaves.

New Idea is easiest to use. Balanced for easy one-man hook-up. Convenient roll pressure adjustment for varying field conditions. Not damaged by rocks. Conditions a full 7-ft. swath. Puts up better hay in one less day. Can be hitched behind NEW IDEA semi-mounted mower for one-time-over mowing and conditioning.

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End each day acres and bushels ahead!

From 7 to 18 feet McCormick combines give you more threshing capacity, size for size

Now, combine faster, with fewer stops, to finish sooner in any crop. Save grain others lose where crops are heavy or down. You can see and measure this *extra* crop-saving capacity of McCormick® combines. And a tryout in a heavy crop proves that famous 3-point separation and exclusive opposed-action cleaning make them even bigger than they look. Short-cut your harvest with a McCormick combine tailored to your needs. Nine models—19 different platform and separator combinations—round out the world's greatest line!

Get giant capacity for big fields

The huge 80-horsepower McCormick No. 181 gives you the most threshing capacity ever in a combine. It's almost 4 feet wide inside, with a tremendous 41 square feet for separating . . . 31 square feet for cleaning. Get a 12, 14, 16, or 18-foot platform, to meet your needs. Or select the No. 151, with big 37-inch separator and 75 horsepower engine. Twelve, 14, or 16-foot platform . . . corn head is available.

YOU'RE A BIGGER MAN ON A McCORMICK COMBINE

Farm Quarterly, Vol. Fifteen, No. Two. Editorial, Circulation and Executive Offices, 22 East 12th Street, Cincinnati, Ohio. Published quarterly by F. & W. Publishing Corp. Subscription price 50c a copy; $2.00 for one year, $3.50 for two years; $5.00 for three years. Add $1.00 per year extra for rates outside the United States and Canada. Entered as second-class matter at the Post Office, Cincinnati, Ohio, under the Act of March 3, 1879. (Title Reg. U.S. Pat. Off.)

Combine sorghums, fast and clean

Deep-set augers leave extra room for the reel to sweep branchy heads onto the platform. Big threshing capacity and wide range of adjustment put extra bushels in the tank . . . reduce scuffing and cracking of kernels.

The 8½ or 10-foot McCormick No. 91 is shown. It's the most maneuverable combine ever built! Turn on the spot . . . reverse instantly, with *exclusive* lever steering. Beat them all in small fields . . . make quick work of big fields, too!

NEW! 7-ft. pull-behind with auger platform

Get the grain-saving advantages of giant self-propelleds in a low cost, pto-powered 7-footer. No. 80 features a clean-cutting platform with deep-set auger. Three-point separation . . . by bar-and-wire-grate concave, extra-long finger grate, and big area straw rack . . . saves more grain. Opposed-action cleaning units eliminate straw bridging and grain wasting chaff build up, put cleaner grain in the bin. Cleaning units are full separator width.

Compare self-propelled or pull-type rigs

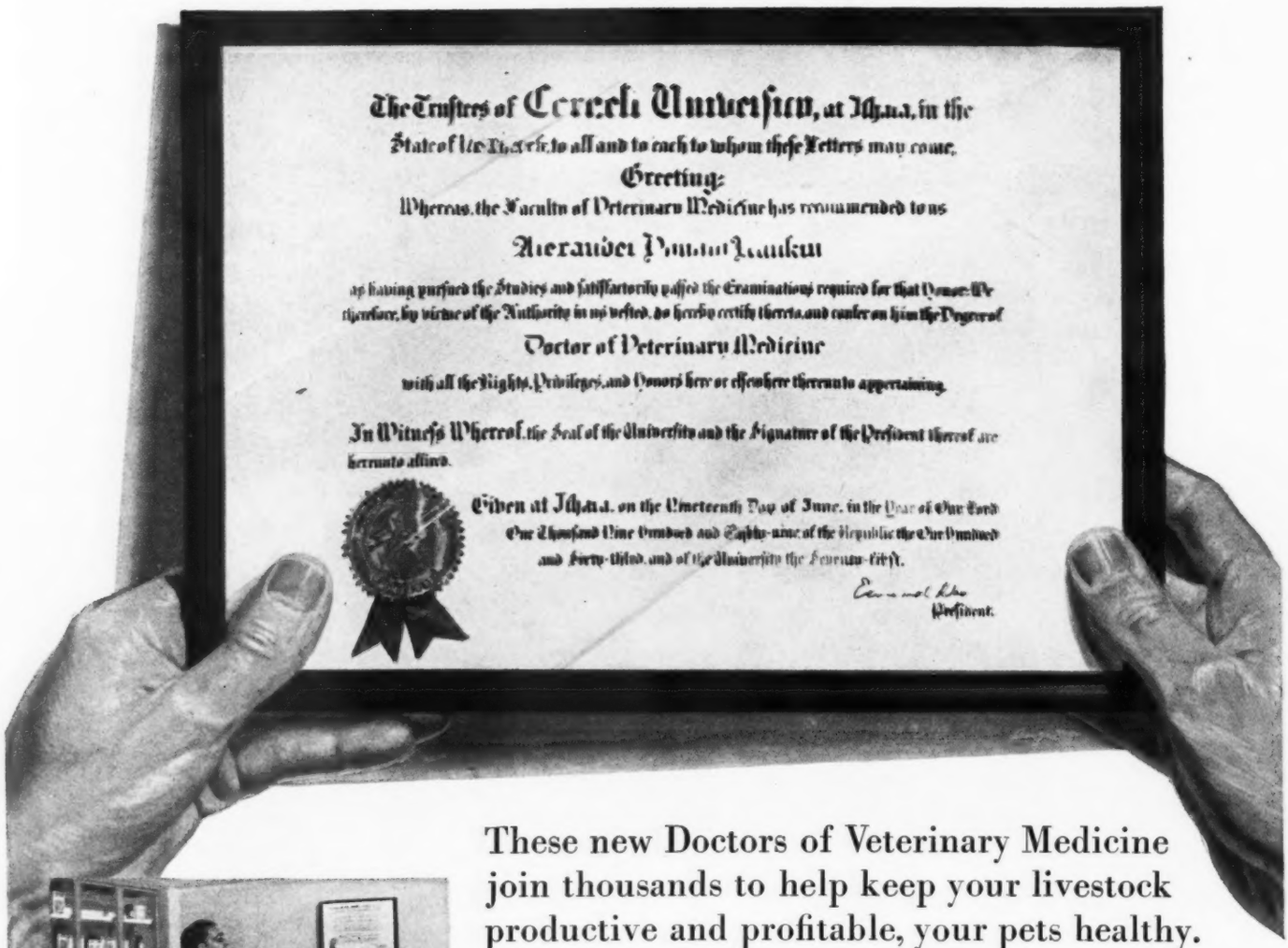
Size for size, you'll find McCormick combines first in acre and bushel per day capacity . . . first in grain-saving ability. For custom operation, or for your own crops, they're champs. The 101, 151, and 181 are available with air-conditioned cab for all-season comfort. See them now!

Pick and shell . . . cut corn harvest costs

Save corn . . . save time . . . cut your per-acre machine investment with a heavy-duty corn head for your McCormick No. 151, 101, or 91! Extra big feed openings even swallow heavy, trashy crops fast. Shelled corn goes into the tank really clean, in top condition for drying and storage. The 58 horsepower No. 101, shown, is also available with 10, 12, or 14-foot grain platforms.

INTERNATIONAL HARVESTER

Every year hundreds of new diplomas go up


The Trustees of Cornell University, at Ithaca, in the
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Greeting:
Whereas, the Faculty of Veterinary Medicine has recommended to us
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as having pursued the Studies and satisfactorily passed the Examinations required for that Degree: We therefore, by virtue of the Authority in us vested, do hereby certify thereto, and confer on him the Degree of
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Given at Ithaca, on the Nineteenth Day of June, in the Year of Our Lord One Thousand Nine Hundred and Eighty-nine of the Republic the One Hundred and Forty-third, and of the University the Seventy-first.
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These new Doctors of Veterinary Medicine join thousands to help keep your livestock productive and profitable, your pets healthy.

It's a great day for the graduate veterinarian—the day he begins his professional practice. And for his community, this man and his diploma mean that expert training and skill are on call when and where they're needed.

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Trust your veterinarian to care for your animals as scrupulously as he would his own. When he administers a drug, trust him to choose the finest for the purpose and to administer it properly.

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HOME READING

NOW...

4 NEW JOHN DEERE HI-LO COMBINES

to speed up your harvests of corn and beans

sizes from 8 to 18 feet

Above, the new 8-foot Hi-Lo 40 with two-row corn attachment.

You have a choice of four new John Deere Hi-Lo Self-Propelleds ranging in size from 8 to 18 feet —each with a high, comfortable operator's platform—low, compact lines for easy transport and storage. There's a fold-back unloading auger to reduce storage width. On all models but the 8-foot "40," cylinder and concave spacing is controlled from the operator's platform. There's a responsive hydraulic reel lift and a variable reel-speed control which are also operated from the combine seat (available as special equipment).

In addition to these new features, Hi-Lo Combines give you all the outstanding advantages that made previous John Deere Self-Propelleds so popular with grain, bean, and corn growers. Among these are selective ground speed . . . balanced feeding, threshing, separating, and cleaning units . . . and 90 per cent separation in the cylinder area.

See your John Deere dealer for complete details on the new Hi-Lo Combine that best fits your needs. His credit plan makes ownership easy.

At right, the Hi-Lo 45 with 12-foot platform.

JOHN DEERE

"WHEREVER CROPS GROW, THERE'S A GROWING DEMAND FOR JOHN DEERE FARM EQUIPMENT"

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☐ 10-, 12-foot 45 ☐ 16-, 18-foot 95

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Here modern science makes certain the nutritional dependability of Wayne Feeds . . . available to you in programs fitted to your needs for the most efficient production of meat, milk and eggs.

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Precise manufacturing methods and quality control standards at modern Wayne Feed Plants further assure that the formula will perform as predicted *on your farm.*

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New lightweight PIONEER CHAIN SAW handles any farm cutting job!

The all-new PIONEER "400" will cut your firewood, fence posts, brush, dock stakes or what-have-you with an ease that's hard to believe! This surprising chain saw trims and limbs orchard or ornamental trees quickly . . . tackles a thousand tough farm and wood-lot cutting jobs . . . accomplishes them with minimum effort.

Here at last is a truly lightweight chain saw that makes sense. Weighs only twenty pounds . . . shaped and balanced to handle with utmost ease. Yet the new "400" is tough . . . packs the lugging power to double as a production chain saw for farmer-loggers who harvest annual tree crops.

But seeing is believing! Prove to yourself how this powerful, tremendously versatile new chain saw will fit your operation. Call your PIONEER dealer now for a free demonstration.

FREE ILLUSTRATED BOOK

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PIONEER SAWS

DIVISION OUTBOARD MARINE CORPORATION
Department PFQ-60, Waukegan, Illinois

The Farm QUARTERLY

Summer, 1960, Vol. 15, No. 2

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THE FARM QUARTERLY

22 East Twelfth Street, Cincinnati 10, Ohio

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Autumn issue on sale August 6 at all Class A newsstands. Note that Farm Quarterly is being published one month earlier to help you in your pre-season planning.

"YOU NAME THE FARM JOB – FIRESTONES WILL DO IT!"

says John Robison, De Witt, Illinois. "Firestones bite in and take hold in our tough-pulling clay soil. Their treads wear longer on pavement and fieldwork both. You name the job and I'll pick Firestones—they're the best all-around farm tires made! And my Firestone Dealer in Clinton, Vachel Best, is tops in the service department."

Like John Robison, you'll find these Firestone features deliver extra service at no extra cost!

• ***EXCLUSIVE*** **SHOCK-FORTIFIED CORD**—proven in actual competitive tests to be far stronger . . . up to 34%. This means more protection than ever before against impact breaks for more hours of tire use and extra retreads.

• **DUAL CONSTRUCTION**—Firestone uses two completely different rubber compounds to precision build rear tractor tires. Treads are built with tough, longer wearing Firestone Rubber-X while another specially formulated Rubber-X Compound in sidewalls *only* resists aging, cracking and flex damage.

• **CURVED AND TAPERED TRACTION BARS**—flat contoured tread bites deep and grips for maximum drawbar power . . . cleans easily, automatically!

• **FREE LOANER TRACTOR TIRE SERVICE**—Firestone will loan you *brand-new* tractor tires to keep equipment working during retreads and repairs.

For outstanding traction and greater economy buy Firestone All Traction Champion, Champion Ground Grip or special purpose All Non-Skid tractor tires. See your Firestone Dealer or Store for all of the facts. He's ready to deal!

*Firestone T.M.

ALWAYS A YEAR TO PAY

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BETTER RUBBER FROM START TO FINISH

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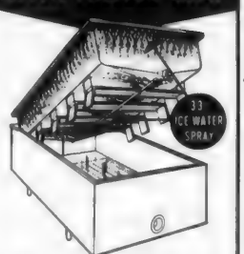
DARI-KOOL ANNOUNCES NEW PURCHASE PLAN

• NO MONEY DOWN • 4 YEARS TO PAY • AT 4%

Let Your DARI-KOOL Pay For Itself-While You Use It!

DARI-KOOL COOLS MILK FASTER THAN ANY OTHER COOLER— *NEVER FREEZES MILK*



33° ice-water is pressure-sprayed over all 4 sides and the entire bottom of the milk tank. Milk heat is removed faster than is possible with any other cooler or method.

With Dari-Kool's new Purchase Plan you can have the benefits of owning America's largest-selling cooler . . . *right now . . . with no down payment . . . and with four years to pay.* The economies effected by bulk handling will more than pay for your cooler and do it in less than four years.

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See your Dari-Kool dealer or mail the coupon and learn how easy it is to own America's No. 1 cooler. There is no obligation.

MEETS ALL 3A STANDARDS

DARI-KOOL
BULK MILK COOLERS

DAIRY EQUIPMENT COMPANY
Dept. 60, Madison, Wisconsin

Please send me complete information on Dari-Kool bulk milk coolers and the new Purchase Plan.

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TOWN.....RFD.....

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. . . by aiding in pasture management. In addition to protecting against trace-mineral deficiencies, Sterling Blusalt can improve your control of livestock movement on pasture or range. By rotating the free-choice supply of salt, you can direct the movement of the animals to fresh pasture. Simply rotate blocks of Sterling Blusalt or loose Blusalt in a weather-protected feeder. Feeders may also be used to hold salt-and-calcium-phosphorus mixes. A booklet containing plans for several types of salt feeders may be obtained from International Salt Company, Clarks Summit, Pennsylvania. Our Animal Nutrition Department will also gladly answer questions on pasture management or any other matter concerning salt.

Service and research are the extras in

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Real Salty Salt!

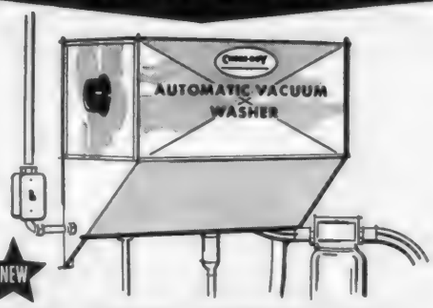
announcing the new

CHORE BOY

LOW VACUUM · PIPELINE MILKING SYSTEMS

GOLD STAR

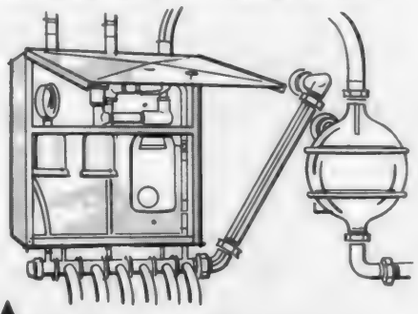
New GOLD STAR CHORE-BOY Features



NEW

VACUUM-OPERATED AUTOMATIC WASHER

Turn a switch and your entire washing operation will be done without further attention. Automatically removes milk from line, adds proper amount of detergents and hot water, rinses system, all by vacuum.



NEW

VACUUM CONTROL CABINET

Vacuum controls, vacuum gauge, releaser pulsator, air injector and moisture-trap are all packed in a stainless steel cabinet. It makes for easier, more convenient operation and a neater, cleaner installation.

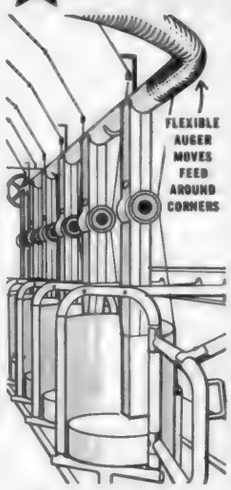
NEW

SEALED VACUUM CONTROL

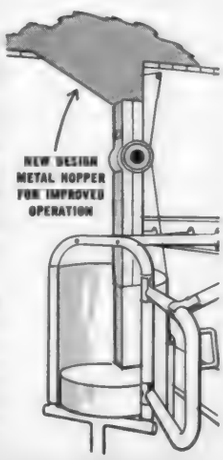
Vacuum controls are sealed inside a bell-shaped, nylon container with an air filter at the bottom. The controls are sealed. A broken seal indicates tampering.

NEW

ROTARY FEEDER FOR HERRINGBONE STALLS



Accurately meters and conserves feed. Operates by pull cord with automatic recoil. New flexible auger conveys feed around corners. Operates with only one motor for double-Herringbone System.



NEW

GRAVITY FEED

Designed for the dairyman who prefers a gravity feeding system. The large capacity, triangular, metal hopper assures proper flow of feed at all times. Hopper is filled from above.

CHORE-BOY again moves up to a new high level in Pipeline Development!

Chore-Boy's policy of specializing on pipeline milker research, development and manufacture has again paid off in the new features shown here. These exclusive new developments are now combined with previous tried-and-proved features such as —

Gentle Low-Vacuum combined with the Chore-Boy pulsation system not only milks faster and cleaner but helps remove a major cause of mastitis.

The Master Pulsator provides uniform milking with a minimum of maintenance.

Cleaning-In-Place, in the most effective way, without an additional pump.

Complete visibility with the Pyrex Glass Roll-O-Clean Releaser and glass pipe.

Simplicity of construction and operation.

The glass Roll-O-Measure which measures the production of each cow at each milking.

Proof that dairymen have approved Chore-Boy's new approach to milking is evidenced by the fact that Chore-Boy is now FIRST in the sale of pipeline milking systems. All Chore-Boy Systems are backed by our Gold Star Guarantee and Service Policy and sold by specially trained dealers. They can be purchased on easy terms and pay for themselves while you use them. Nothing will put more pleasure and profit in dairying.

CHORE-BOY "KNOW-HOW" MAN

He is trained to help you put your dairy operation on a real money making basis. With his advice you will have an efficient plant producing top quality milk at lowest cost.

CHORE-BOY LOW-VACUUM MILKING SYSTEMS

CHORE-BOY PURCHASE PLAN

Use your Chore-Boy equipment while it pays for itself — with 36 months to pay — or 5 years with purchases of $2,000 or more. You are covered by fire and comprehensive insurance.

For Information, write Dept. 45, **CHORE-BOY MANUFACTURING CO., Inc.**, Cambridge City, Indiana

HEALTHIER PROFITS OUT OF A RED AND GREEN BAG!

Here's how AUREOMYCIN Crumbles produces more product for market . . . no matter what combination of livestock you raise.

AUREOMYCIN® Crumbles mean improved health . . . healthier profits in any livestock operation —large, small or in-between.

University and experiment station tests plus the experience of thousands of livestock men prove that the use of AUREOMYCIN Crumbles is an important factor in good livestock management.

Here's why: Normal animals on AUREOMYCIN Crumbles reach a higher potential through better health. They look better, feel better, do better.

That's because animals have hidden diseases – bacterial burdens which scientists call subclinical infections. These hidden diseases slow growth, sap strength and vigor, help make tail enders in the feed lot, hog pen or milking line. Under stress conditions they can flare up, causing serious setbacks and losses. Stress and hidden disease may account for outbreaks of shipping fever, foot rot, scours and many other livestock diseases.

Hidden diseases, as well as disease flare-ups, hold an animal back, cause failure to make profitable weight gains or to reach maximum capacity in the milking line.

AUREOMYCIN Crumbles help keep these hidden diseases in check—in beef cattle, sheep, hogs and dairy cows.

Healthier Profits for Beef Cattlemen

AUREOMYCIN Crumbles help control bacterial diarrhea (scours), foot rot, liver abscesses, respiratory infections (shipping fever complex) and anaplasmosis in beef cattle.

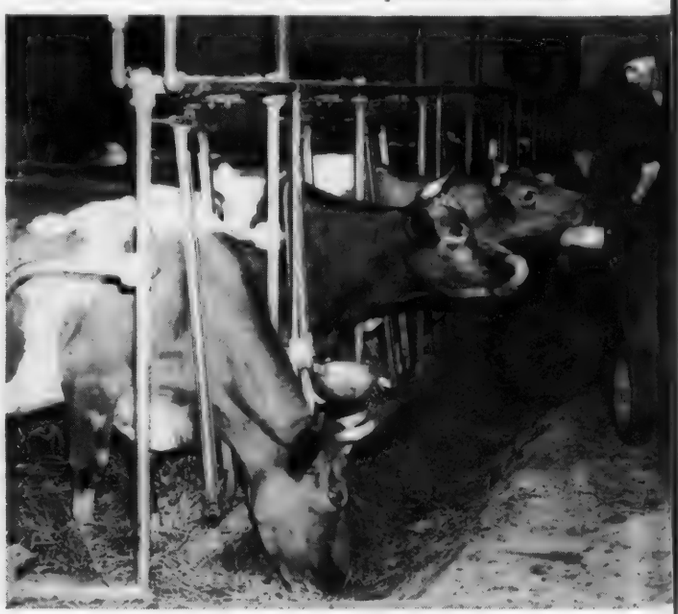
Weight gains are improved; feed efficiency is increased. You get better "bloom," finer carcass quality...the kind buyers prefer!

Healthier Profits for Sheepmen

AUREOMYCIN Crumbles help get lambs on full feed faster. Changeover time, special mixes and hand feeding can be cut down. There is less scouring and less enterotoxemia. Respiratory infections are reduced, off-feed days are cut down and there will be fewer tailenders. Your animals "perk up," show a brighter eye, improved fleece and better finish.

In a recent trial in Iowa, a pig herd was divided into two lots at weaning. The lot fed AUREOMYCIN gained 15 per cent more per day than the lot not receiving the antibiotic—at a saving of 36 pounds of feed per 100 pounds of weight gain.

Dairymen using AUREOMYCIN Crumbles find that AUREOMYCIN will not replace good herd management . . . nor will they "make more milk." They have found, however, that the better herd health achieved with AUREOMYCIN results in a better production record.



In one trial on four lots of sheep there were 42 deaths from enterotoxemia in the lots not receiving—or taken off the antibiotic. In the two lots receiving AUREOMYCIN, and kept on it, there were no deaths.

Healthier Profits for Hog Raisers

Hog raisers find that AUREOMYCIN Crumbles help control bacterial scours (enteritis – necrotic enteritis—vibrio dysentery – baby pig bacterial diarrhea) and cervical abscesses. They help maintain weight gains in herds with atrophic rhinitis and increase weight gains and feed efficiency. Feeder pigs may look well – but never reach full growth potential. AUREOMYCIN Crumbles help you get the most out of *any* swine herd.

Healthier Profits for Dairymen

AUREOMYCIN Crumbles give the dairyman these invaluable advantages – they help maintain high herd health, check bacterial scours, control foot rot, reduce losses from respiratory infections (pneumonia, infectious rhinotracheitis, shipping fever complex) and increase growth rate and feed efficiency in calves.

AUREOMYCIN won't "make more milk"—but it will result in a healthier herd better able to reach its maximum bred-in capacity.

In another recent trial a lot of 600-pound feeder cattle was divided into two groups. At the end of 90 days the group receiving AUREOMYCIN averaged 18 per cent higher daily weight gains—on 12 per cent less feed per pound of gain.

Easy to Use

One product—AUREOMYCIN Crumbles – gives you all these profit-making advantages, no matter what combination of livestock you raise. You don't need several *different* products—one does the job! Use AUREOMYCIN Crumbles, according to directions, with any kind of ration, with your beef cattle, sheep, swine or dairy stock – and get *healthier profits!* American Cyanamid Company, Agricultural Division, New York 20, New York. ®*AUREOMYCIN is American Cyanamid Company's trademark for chlortetracycline.*

AUREOMYCIN Crumbles, furnished in 50-lb. bags are available from your veterinarian, druggist or feed dealer. If you would like to "see for yourself" ask your regular supplier for a free trial sample.

CYANAMID
AUREOMYCIN
CRUMBLES

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

"FIELD OR HIGHWAY HAULING...OUR TRUCK DOES BOTH AT LOWER COST with an Eaton 2-Speed Axle"

—SAYS FARMER HARLO R. JOHNSON, HASTINGS, MINNESOTA

"Our truck is a 1957 GMC with an Eaton 2-Speed Axle," says Mr. Johnson. "We use it to harvest our crops—corn, soybeans and alfalfa—haul them to market, and handle all kinds of trucking chores around the farm. We first purchased an Eaton 2-Speed equipped truck in 1950, because we needed a truck that could operate efficiently in the field *and* on the roads.

"Soft ground is no problem for an Eaton 2-Speed. That's one of its big advantages. With this powerful low-gear range, a truck has the muscle it needs to pull the heaviest payloads through the fields. We've never bogged down with an Eaton—even on rainsoaked ground. On the hills and over rough, unimproved roads, the low-gear range lets our truck make better time, empty or loaded.

"Lower operating costs are another big Eaton advantage. By providing the right gear ratio for every road and load, there's far less strain on the engine and other power-transmitting parts. That means less overall truck maintenance, longer truck life, and fuel savings every year."

Discover for yourself the advantages of an Eaton 2-Speed Axle. Ask your truck dealer for a demonstration today.

"OUR DELIVERY TIME IS CUT 25% because of the Eaton 2-Speed," continues Mr. Johnson. "In high-gear range, our truck rolls capacity loads down the highways at full legal speed. We haul more in less time and get more work done. Our profits show it."

GMC DEALER John M. Schneider, Schneider Motor and Implement Co., Hastings, Minnesota, says, "Eaton 2-Speed Axles have probably done more to further good relations with our farm customers than anything else we sell. Eaton performance and economy more than live up to customer expectations. Once they've used an Eaton - equipped truck, the farmers in this area won't settle for any other kind."

EATON

2-SPEED TRUCK AXLES

MORE THAN 2 MILLION EATON AXLES IN TRUCKS TODAY

EATON MANUFACTURING COMPANY, CLEVELAND 10, OHIO

WORKIN'EST "8 FOOTER" MADE!

Lowest priced SP combine on the market: the MH 35 The sleek, hard-working Massey-Harris 35 is the best reason yet for you operators of family-size farms to step up to man-hour-saving self-propelled combining. Its price tag is the lowest. And it pays off that investment fast, with high-capacity performance in dozens of crops through harvest after harvest.

The MH 35 was engineered from cutter bar to straw spreader to out-combine anything else in the "8 foot class." And it has already proved on thousands of farms that no other SP combine anywhere near its price can match it.

It has the same exclusive Balanced Separation and straight-through design that have made the big Massey-Harris combines world-famous for fast, crop-saving combining efficiency. It has an engine with power to spare. Turning brakes, short turning radius and anti-backlash steering make it easy to handle. It is low, compact; travels safely, clears gates easily.

Picture yourself up on the handsome, hard-working MH 35. It costs less than you think to own one! . . . This message from Massey-Ferguson continues on next page.

Look, compare . . . you'll be a Massey-Ferguson man!

NEW "LIGHT HEAVYWEIGHT CHAMP" OF THE HARVEST

For medium to large farms, the MH 72 out-combines anything in its class!

Step aboard the streamlined Massey-Harris 72. Ease yourself into the adjustable, padded comfort seat, with all controls within easy reach. Step on the starter and get the feel of its surging, precision-controlled power . . . and you'll feel the pride of owning the most advanced SP combine in its class. No other can equal its brilliant performance. Only bigger, much costlier machines surpass its grain-getting, grain-saving capacity!

This 10 or 12 ft. combine, for medium to large farms, has every one of the most advanced features of Massey-Harris engineering. Exclusive Balanced Separation. Full 28-inch adjustable concave and rasp bar cylinder where over 90% of the threshing takes place. New, longer, open-bottom straw walkers with full-length return pan for better separation. New shaker shoe action for dockage-saving cleaning. And a new, low, 35-bushel grain tank that makes the MH 72 the sleekest, lowest, easiest to handle, transport and store, in its class.

See it. Compare it. Nothing in its class matches the Massey-Harris 72!

Pull-Type Massey-Harris 35 brings to operators of family-size farms the high capacity and grain-saving efficiency of the MH 35 self-propelled combine (previous page) in an even lower priced pull-behind model. Available with 7 ft. 3 in. or 8 ft. tables. Operates efficiently with a 2-3 plow tractor.

World-famous Harvest Streamliners . . . the big Massey-Harris 14-ft. 82 and 16-ft. 92, known and respected the world over for big-capacity performance in big-acreage combining. Balanced separation, with full-width, straight-through design. Exclusive Massey-Harris lower, safer, ground-hugging profile.

VICTORY AT SUNDOWN!

Giant new Super 92 proves it's the biggest capacity Massey-Harris combine ever!

All last summer, newly engineered Massey-Harris Super 92s followed the harvest. With them went Massey-Ferguson combine engineers, measuring the Super 92s' ability to harvest maximum capacity with minimum field loss. At sundown, day after day, the engineers saw proof that in crop after crop the giant new Super 92s delivered greater capacity than any previous Massey-Harris combine, by a record 20% margin!

What makes this possible is a unique combination of engineering refinements: a much wider straw walker body area with six open-bottom straw walkers and full-length return pan for better separation at higher feed rates; new shaker shoe action for cleaner grain with minimum loss.

And the Super 92 has the famous Massey-Harris low profile and lower, safer center of gravity. If it's big, big capacity you want, the giant new Super 92 is the combine to see!

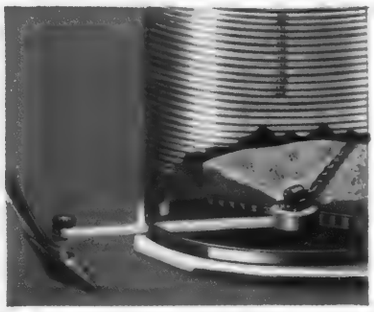
Now it's

MASSEY-FERGUSON

Massey-Ferguson Inc., Racine, Wisconsin

World's largest manufacturer of self-propelled combines

A 37,400-bu. corn crop...dried for 1½¢ a bushel in a Butler Stor-N-Dry® Center



Now! Automatic Butler Bin Unloader empties bins completely; no back-breaking labor.

For details, see your Butler Blue Ribbon Dealer. Write direct for free booklet, "On-Farm Drying Pays."

Last fall, Mel Fisher, manager of the Owens-Chilton Farm at New Harmony, Indiana had a big corn crop. He wanted to harvest it early, dry it fast and then hold for best prices. But he wanted to keep his drying and storage costs down—to make a top profit on every bushel.

After carefully studying other equipment, Mel Fisher decided on a circular Butler Stor-N-Dry Center. He hasn't been sorry.

He used two 4,400-bushel bins—equipped with Butler fans, heaters and perforated floors—to dry his corn fast and evenly. Then, he moved the corn to eight 5,130-bushel storage bins with Butler automatic bin unloaders and outside augers.

In this way, Mel Fisher was able to quick-dry his entire 37,400-bushel crop (from 18% to 13%) at a cost of only 1½¢ a bushel . . . in spite of heavy rains. "And next season, we hope to install additional Butler drying equipment in our Stor-N-Dry center to dry our corn even faster—and with less labor," Mel says.

You, too, can cut your grain handling and drying costs when you buy a Stor-N-Dry Center. Original cost is low, and can be financed locally on easy terms. And you get everything in one complete package. It's the lowest-cost way to dry and store a large grain crop—fast!

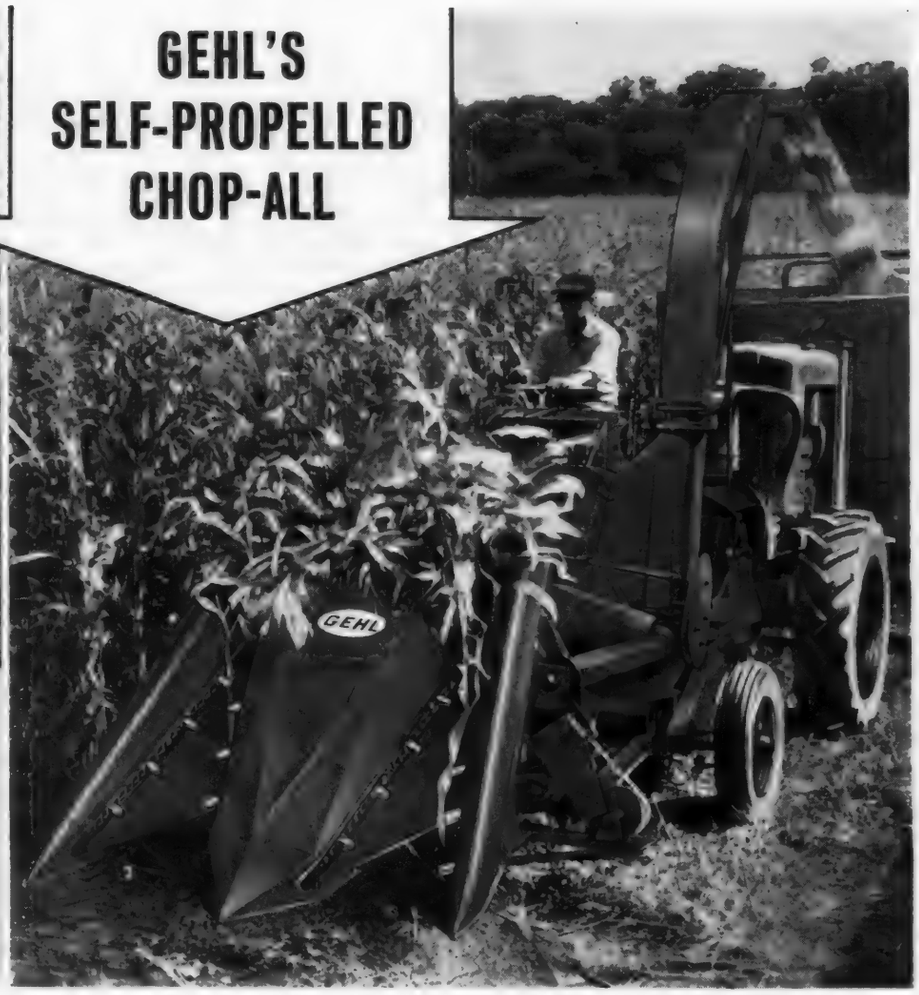
BUTLER

BUTLER MANUFACTURING COMPANY

Dept. 378, P.O. 7027, 1020 East 63rd Street, Kansas City 13, Missouri
978A Sixth Avenue, S.E., Minneapolis 14, Minnesota
921 Avenue W, Ensley, Birmingham 8, Alabama
Dept. 78A, 2710 Butler Avenue, Richmond 1, California

Manufacturers of Equipment for Farming, Oil Transportation, Outdoor Advertising • Metal Buildings • Contract Manufacturing
Factories at Kansas City, Mo. • Minneapolis, Minn. • Galesburg, Ill. • Richmond, Calif. • Birmingham, Ala. • Houston, Tex. • Burlington, Ontario, Canada

GEHL'S SELF-PROPELLED CHOP-ALL



Standing row crops, windrows, direct-cut grain or grass — it's self-propelled feed-making by Gehl

Built like your tractor

steers from the front . . . drives from the rear for "tractor traction and control" down the rows or over the road

Five minutes behind the wheel of a Gehl Self-Propelled Chop-All and you know it as well as the back of your hand. You're comfortable — relaxed as you boss 109 hp of high-stepping feed harvester.

Tractor-style controls lay into your hands naturally for precision steering, instant response, fast changes with the variable traction drive. You move down any field at speeds suitable to varying crop conditions getting every stalk with Gehl's ground-line gathering chains . . . hugging the ground with pickup to clean off doubled-up windrows . . . cutting a full 6-foot mower-bar swath in heavyweight alfalfa. The speeds are all there — 1½ to 16 m.p.h.

This one has the same fine cutting ideas of Gehl's PTO Chop-All — radial shearing with inside to outside action, power-driven compression rolls, fan power that fills the wagon corners first.

And the Gehl SP has the weight over the drive wheels — tractor style — where it delivers cleat-digging traction — more working traction that hugs side hills and slopes, takes you up the grades and through the low spots without a spinout. Back up this SP brute with individually operated hydraulic brakes and Gehl durability in every brace, nut and bolt and you're top man in any field for years to come.

There's more to this power and capacity story. The coupon brings the details from Gehl. 16-60R1

GEHL

101 YEARS OF SERVICE

Gehl puts all price factors in your favor

GEHL BROS. MANUFACTURING COMPANY
Dept. PE-21-16, West Bend, Wisconsin

Please send me complete details on the Gehl Self-Propelled Chop-All.

Name.....

Route.....Town.....

State..... ☐ I am a Student.....

NEW

52 DBHP D4
SERIES C

75 DBHP D6
SERIES B

2 great new Caterpillar track-type Tractors!

Plow power—these new Cat Diesel Tractors really have it! Geared-to-the-ground plow power to handle big and wide hitches that cover *acres per hour.* It's not unusual, in favorable soil conditions, for the D4 to plow as many as 30 – 40 acres per day, and the D6 can handle up to 50 acres per day.

Of course, you want more than plow power—and these new Cat track-type Tractors *have much more:* Work over freshly plowed ground without rutting or harmful soil packing • Go where wheels fear to tread, up hillsides, over boggy ground, among rocks and stumps • Improve your farm, add acreage by bulldozing trees, rocks, filling gullies, clearing fence rows • Handle belt and power takeoff work • Clean out feedlots, pull heavy loads, move farm buildings, build roads and ditches—and a host of other jobs. These tractors are *truly* versatile farm tools!

D4 has 52 DBHP, 13,000 lb. pull (about twice as much pull as most 4 – 5 bottom wheel tractors) and usually plows all day on 25 gallons of low-cost furnace oil.

D6 develops 75 DBHP, pulls 19,495 lb.—plenty of weight and power for farming large acreages, good-sized land clearing jobs.

D4 and D6 features: Independent gasoline starting engine with optional in-seat controls assures positive all-weather starting • Direct-electric push-button starting available • Simple, adjustment-free fuel system • Lifetime lubricated rollers and idlers • Dry-type air cleaner removes 99.8% of dust from air entering diesel • Arm chair operation comfort • Exclusive oil clutch standard on D6, optional on D4.

MORE THAN 30 DIRECT-MOUNTED TOOLS TO MATCH YOUR NEEDS
"Swing-around" tool bars and tool bar-mounted subsoilers, chisels, ditchers, cultivators, plows, bulldozers and rakes. Other tractor-mounted equipment: loader (for D4 only), heavy-duty straight and angling bulldozers, stumpers, root and brush rakes, root plows.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

SEE THE NEW D4 AND D6 AT YOUR DEALER NOW

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

LETTERS

Making Haylage

Sirs:

What is haylage? I would like information for making this same silage in a conventional silo . . .

Byron, Minnesota — Lloyd R. Caulfield

Sirs:

. . . I would like to know what steps to take to make haylage in a conventional cement silo . . .

Watertown, South Dakota — Milton R. Trumm

Sirs:

. . . You can imagine my delight when I read of a man who knows how to make "haylage" in a conventional silo along with a multitude of other tricks of the trade. We are about to invest another 10-20,000 dollars of 5½% money in silos and I very badly need to have further information.

Tonganoxie, Kansas — Gordon B. Hurlbut, Jr.

Dr. Rogers tells all in "The Last Word," page 150.

Corn Harvesting Chart

Sirs:

There are three typographical errors in the Corn Harvesting Chart on page 84, of the Spring issue. Under item D, Feeding Value Gain, the figure 1490 should be eliminated in the third column (Ground Ear Silage); and the figures 610 should be eliminated in columns 5 and 6 (Whole Kernel Silage and Kernel).

The thought occurs to me that a reprint of this information with a blank check sheet in which a farmer or student could fill in the proper values would be very popular with many of your high-school teachers and others.

B. J. Lamp, Jr.
Associate Professor
Agricultural Engineering Department
The Ohio State University
Columbus, Ohio

Thank you, Mr. Lamp. And we would suggest that all readers who keep their back issues make the corrections indicated.

Those Sons of . . .!

Sirs:

Your otherwise largely fine and useful rag reflects in this Spring issue the surprising delusion that anybody who can read might enjoy "The Hunter of Washabaugh County."

What is the appeal of this senile delinquent sic-ing his hoodlum gang of mutts indiscriminately on any innocent handy victim? The use of the term "sport" in connection with this relish of mass atrocity went out along with the toothless medieval faces around the bear pit.

"See that courage!"—"The coyote fights to the last breath."—The badger's "guts all over the flat but he still fights." Why not tie a chicken under a steam-roller. You could brag about your prowess. And oh, the sport and guts!

"What could be bigger than this?" asks the old fool, which question renders your impressed author Koch helpless. It renders me helpless too. What could be a bigger Jerk? What could be smaller?

Spring Cove Farm — John H. Porter
Centreville, Maryland

Heir of Greatness

Sirs:

The covering of the life of my great grandfather (Winter, 1960) is the best and most accurate I ever read. When you come to France I will be very glad to show you all the letters and belongings attached to his memory. Among those, the letters of Humboldt and Pasteur are most interesting.

3 Rue De Chanaleilles — A. C. Boussingault
Paris, France

Home of Minimum Tillage

Sirs:

We read with interest the article entitled "New Ways to Grow Corn" which appeared in the Spring issue of FARM QUARTERLY. We here at Michigan State University, particularly in the Soil Science and Agricultural Engineering Departments, are very proud of the fact that the original work done in this field was conducted here. As a matter of fact, the term "minimum tillage" was coined at Michigan State as the result of research work. . . . Actually, this work was initiated in 1945.

We are certainly happy to know that other states have since taken up the program and have learned of the benefits of minimum tillage. . . . We would estimate that at least 70% of the corn will be wheel-track planted this coming year in Michigan.

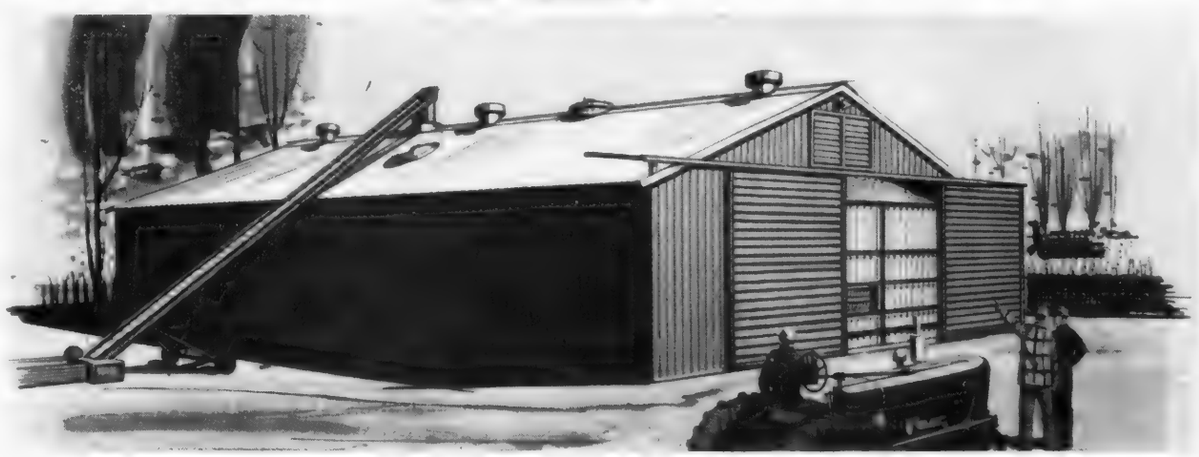
C. M. Hansen
Assistant Professor
Agricultural Engineering Department
Michigan State University
East Lansing, Michigan

GRAIN-MASTER "24"

dollar-saving farm-sized grain storage for livestock feeders and cash-grain growers

Stran-Steel's new Grain-Master "24" pre-engineered building makes common sense for livestock feeders and cash-grain growers alike. It loads to capacity without interior handling. Steep roof slope matches natural slope of piled grain. Pick the size to fit your needs—24 feet wide, any length in multiples of 16 feet. Grain-Master aeration system controls moisture migration—and it's also available with drying systems for small grain and ear corn. Ideal for both grain and equipment storage—a movable bulkhead separates grain from other stored items. Choose from nine sparkling new Stran-Satin protective colors!

Mail the coupon or call your local Stran-Steel dealer. He's listed in the Yellow Pages under Steel Buildings or Buildings—Steel.



Stran Steel®

Stran-Steel Corporation, Dept. FQ-15
Detroit 29, Michigan
Send the new Grain-Master "24" catalog and information on Stran-Satin Color. I'm interested in a building approximately _____ ft. x _____ ft. to be used mainly for _____

Name _____ ☐ Student
Address _____ Phone _____
City, State _____

STRAN-STEEL IS A DIVISION OF NATIONAL STEEL CORPORATION

Corn-belt capacity speeds all your harvests

Capacity for corn, beans, grain, sorghum, grass seed

Power—64.7 h.p. engine

Capacity—3570-sq.-in. separator
2534-sq.-in. cleaner

Time—Finger-tip, on-the-go ground speed control

Accuracy—Easy, crank-adjusted cylinder speed*

Now, a time- and money-saving combine with power threshing ability and versatility to harvest *all* your crops. This brand-new, compact Oliver self-propelled wades right through bumper yields—of a wide variety of crops. Here is *genuine corn-belt capacity* that saves time, saves grain in every field. Best of all, it's *priced right for the average-size farm.*

It's loaded with corn-belt features: 10-foot or 12-foot* grain header with choice of four reel speeds; 4-bat standard or 6-bat semi-revolving* reel; easy-change corn header shells as it harvests, handles 100-plus yields. You can change ground speeds on the go hydraulically with a touch of a lever. You can change cylinder speeds in seconds with a turn of a crank*. And you ride up out of the dust on a comfortable rubber-spring seat.

There's much more you'll want to know about this versatile, efficient combine. Talk to your Oliver dealer now. Ask him about his 6% cash bonus trade-in plan.

**Optional, at extra cost.*

THE OLIVER CORPORATION, 400 W. Madison St., Chicago 6, Ill.

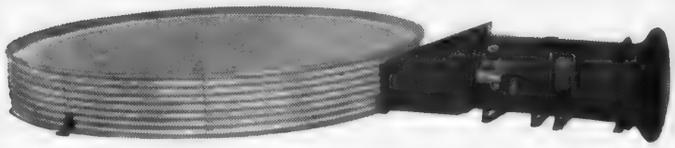
GO BIGGER...GO BETTER—GET OLIVER TEAMED-POWER

LONG

STORAGE & DRYING EQUIPMENT

High quality grain bins with the durability and strength needed. Available in five diameters with capacities from 1,000 to 15,000 bushels. Many important features not found on others. **FASTEST** erection time of any on the market!

Complete line of ventilating fans and heat sections. Heat section capacity from 90,000 to 500,000 BTU. All safety controls. Packaged perforated steel drying floor designed to give even flow of air Strong and Sturdy. All items available for any make bin!



LONG

GRAIN HANDLING EQUIPMENT

11 ft. 4 Inch Heavy Duty Augers from $18.95

11 ft. 6 Inch Gen. Purpose Augers from $38.50

6 inch augers. Patented undercarriage for lowering mast and adjusting center of gravity. Universal motor mount, heavy galvanized tubing and many other features.

25 ft. Double Chain Elevators with undercarriage from $235.00

Double chain elevators. Universal motor mount. Heavy duty construction. Full line of accessory equipment.

17 ft. Bale Conveyors from $83.50

Bale conveyor, heavy duty tubular steel construction. Combinations to fit any bale conveying job.

FREE INFORMATION WRITE TODAY

With LONG Equipment YOU Pocket the Profits!

You too can pocket the profits from on-the-farm grain storing and drying. No matter what size farm, you will find that LONG makes the right combination to suit your conditions . . . and it's ***priced to fit your pocket-book, too!*** It's built to give long and dependable service. Get complete information on this equipment and see why you can pocket extra profits from your grain by controlling handling, drying and storage costs. ***Write today.***

LONG

MANUFACTURING COMPANY, INC.

P. O. BOX 11090—TARBORO, N. C.

Please send FREE literature and prices on the following:

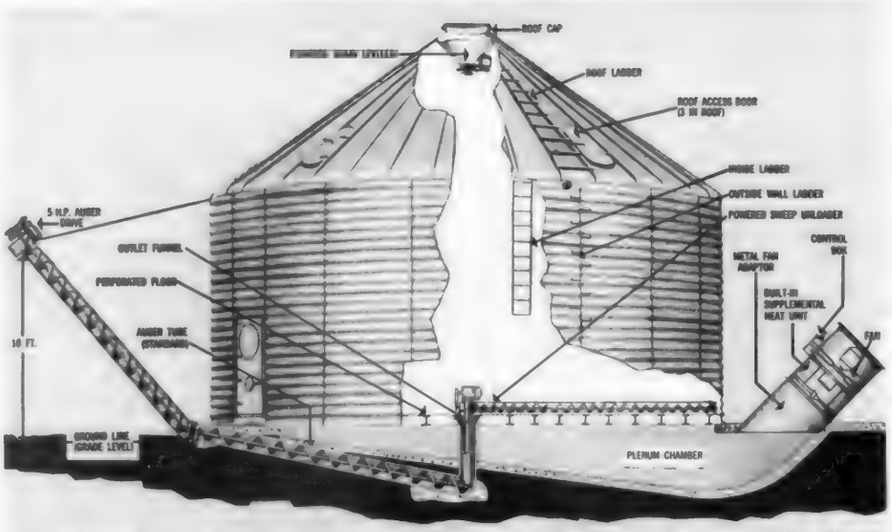
☐ Grain Bins ☐ Drying Fans ☐ Heat Sections ☐ Augers ☐ Elevators ☐ Bale Conveyors ☐ Drying Floors

Name _____

Address _____

City & State _____

Whether you feed or sell grain, you can make more money with LONG Grain Storage and Drying equipment.



New Behlen Grain Drying Tank. Big capacity in-storage dryer with natural air . . . combining supplemental heat when needed. Engineered *especially* for drying grain. Actually designed for sub-normal drying conditions, so weather problem is almost eliminated when drying with natural air. Plenum chamber under perforated drying floor gives uniform air movement through entire batch of grain, eliminating "hot spots," "wet spots." Up to 35,000 cu. ft. of air forced through batch every minute. Two Tank sizes: 12′ sidewalls (6,600 bu. cap.), 20′ sidewalls (10,000 bu. cap.). Diameter 26′9″. Dries, stores corn, wheat, oats, milo, etc.

Harvest-Time Problems Cost You $ $

Rough weather can wreck crop profits unless you are prepared. Solve your problems in just one step. See your Behlen Dealer for *all* grain conditioning and storage needs. You know Behlen products are the very best . . . carefully designed and field tested by engineers who think first of Quality and Performance. See your Behlen Dealer now!

Bonus Grain Storage in Behlen Straightwall. Frameless, all-steel. No ties needed. Widths, 39′, 52′. All clear span. Two models. Grain Storage Straightwall has 30° Steep-Pitch Roof. Utility Straightwall with 16° Low-Pitch Roof for farm workshop, machine shed, etc.

Two Harvest "Hands" Of The '60's! Mechanical drying, flat grain storage. Steel building is Behlen Curvet, for grain and/or machinery. Grain Storage Curvet "40" has "extra rugged" wall strength to store grain 12′ high against sidewalls, 10′ against endwalls, without ties. Multi-Purpose Curvet, 40′ and 53′ widths. Length unlimited for all Curvets.

High Speed Grain Dryer. Behlen lasts many years longer. Dries with controlled heat/air movement . . . not constant grain movement . . . so grain moving machinery is in gear only 1/10 the time. Removes 623 gals. of water from a 500-bu. batch of 30% corn in 2½ hours. Axial Vane Fan forces up to 78 cu. ft. of heated air through every bushel every minute. 4,250,000 BTU burner. Automatic controls. In 270, 375 and 500 bu. sizes. Operates off PTO or electricity . . . burns LP or natural gas.

Bar Mesh Corn Crib. Most popular cribs a-going! Steel bar mesh (over ¼″ dia.) is galvanized *after welding*, with up to 6 times more zinc. "Steep-Pitch" Roof. Sizes: 611 to 1940 bu. Shown is new Natural Air Drying System.

Write for full information, dealer's name:

BEHLEN MANUFACTURING CO.

Dept. F-5

Columbus, Nebraska

Behlen

Farm Books

Beef Cattle, by Roscoe R. Snapp and A. L. Neumann (Fifth Edition). John Wiley and Sons, Inc., New York, $8.50.

This 1960 edition of one of the standard works on beef cattle production puts the stamp of obsolescence on all the former editions. The techniques of breeding and feeding have taken tremendous strides in the seven years since the appearance of the immediately preceding edition and this new information has been included in the new book.

One of the most valuable chapters is a brand-new one, "Heritable Productive Traits in Beef Cattle." It not only reflects the progress made in performance testing but gives the breeder something of a road map showing how far and how fast he can go with genetic selection.—C.R.K.

Developing Farm Woodlands, by John Frederick Preston. McGraw-Hill Book Company, New York, $5.50.

The ex-chief of the Forestry Division of the U. S. Soil Conservation Service wrote more than a text on bringing up trees, from planting to marketing the wood crop. He goes into the underlying principles of every practice. Take thinning as an example. The whys and wherefores are followed by a table which tells how close to thin a tree growing in your area. Also there is a general five-step guide to successful thinning.

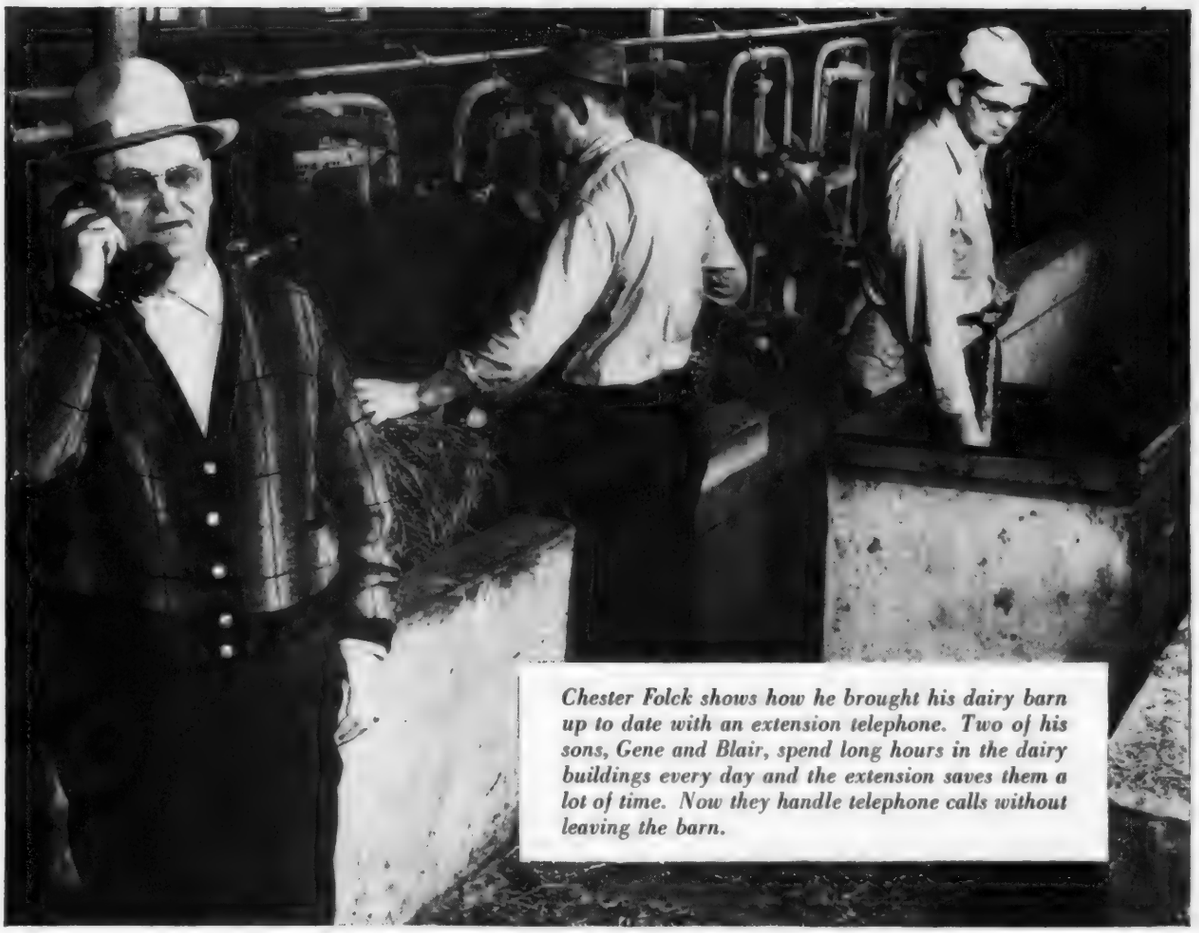
The book is written in the impersonal textbook style, but it's not hard to read. Pictures, sketches, diagrams, and tables help illustrate important points.

The index is handy. If you want to find what tools you need for thinning, you're told to flip to page 122, where, under tools (in italics) you see it's a machete, or double bit, or pole ax you want, and possibly a brush hook. A wordlist of woodman's terms at the end furthers the use of the book as a handy reference for making the most of the old woodlot, or for setting out a new tree crop.—M.B.H.

Farm Income Tax Manual, by John C. O'Byrne. The Allen Smith Company, Indianapolis, $20.00.

O'Byrne's manual is a clear and complete summary of the problems and procedures of keeping and filing proper income tax records. The book is a 600-page filing folder of tax information. The author covers all the details of preparing the farm schedule, and also discusses personal expenses, tax-saving ideas, partnerships, and social security for farmers.

The book is very well indexed, and a "short course" is outlined for those who don't want to struggle through the full depth of tax intricacies. This is an excellent tax reference book.—J.J.M.



Chester Folck shows how he brought his dairy barn up to date with an extension telephone. Two of his sons, Gene and Blair, spend long hours in the dairy buildings every day and the extension saves them a lot of time. Now they handle telephone calls without leaving the barn.

Here's how an extension telephone saves a farm family over 25 days a year

Glenn Folck uses this office telephone to sell purebred Jerseys all over the country. Incoming calls are answered on this telephone. If someone in the dairy buildings is wanted, Glenn rings a bell in the barn simply by pressing a button. "When a man calls you," says Glenn, "he doesn't want to be kept waiting. That barn extension is the answer."

75 head of fine Jersey cattle keep Chester Folck and his three sons busy from early till late on their purebred farm near Springfield, Ohio. Two of his sons, Gene and Blair, spend full time in the dairy buildings. The third, Glenn, handles most of the family's business affairs and spends a good part of his time in the office.

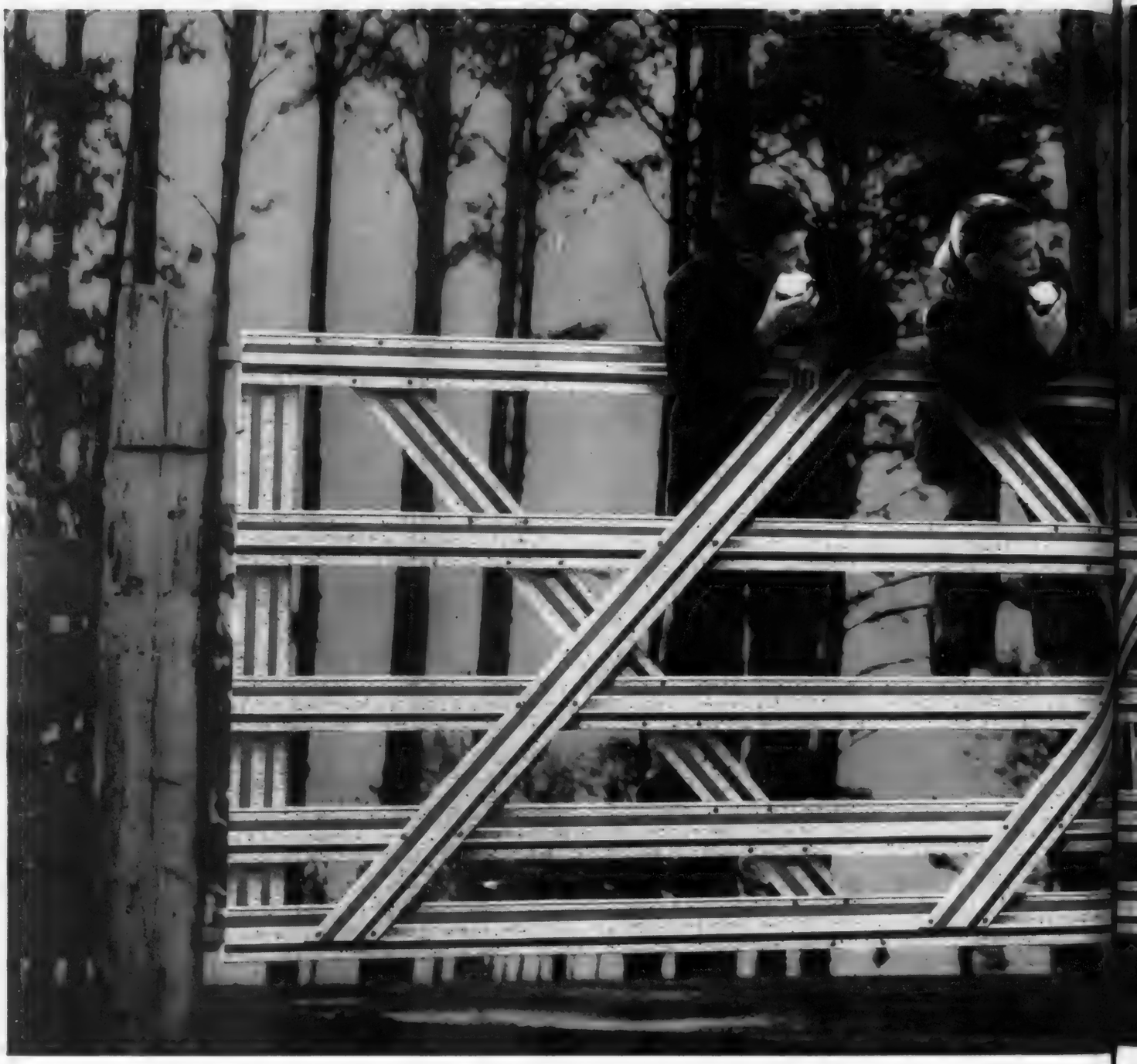
In a usual day the Folcks take or make some 20 to 30 calls on an extension telephone in their barn. Most are business calls. Some are long distance.

"Without that extension phone, we'd have to keep people waiting on the line while we run to fetch someone from the barn," Chester Folck says.

"We figure we'd lose at least a half a day a week between the house and the barn. For the little it costs, we just couldn't afford to be without that extension."

Why not have a look at your own farmstead with an eye to putting in an extension telephone. It can pay its way over and over by saving your time. Convenience is a bonus. Just call your telephone business office. They'll be glad to help.

Bell Telephone System



Let the youngsters ride...

ALCOA GATES ARE

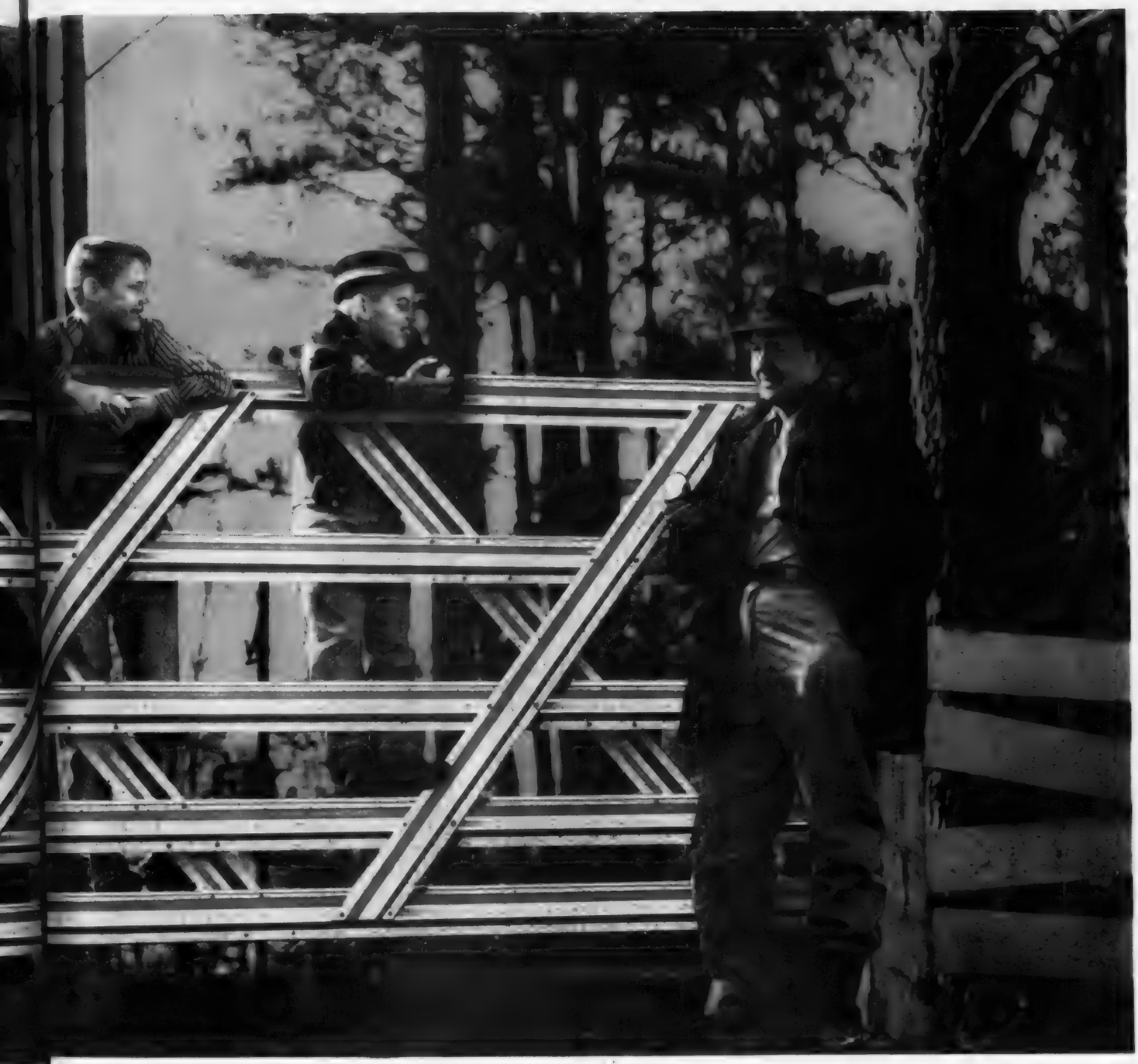
Let the boys pile on! They aren't going to hurt this rugged Alcoa® Aluminum Farm Gate. It's made for rough treatment . . . engineered like a bridge. Cross braces, aircraft riveted, are precisely placed to stand maximum stress.

Alcoa's agricultural engineers designed this gate with just one main idea in mind: durability. Gates must last or they aren't worth hanging. This Alcoa Aluminum Gate will last . . . year after year.

It will dress up your farmstead, too. Your show barn. Your stock pens. It's the best looking farm gate on the market and, what's more, it will stay good looking. Alcoa Gates never need painting or other expensive maintenance.

See the sturdy Alcoa Aluminum Gate at your farm supply dealer's first time you go to town. He has them for openings 10 to 16 ft wide, 52 in. high. There's a special 36-in.-high hog gate, too, if that's what you need.

All Alcoa Gates are made from special, heavy-gage aluminum. They're delivered complete with accessories for easy hanging.



BRUTES FOR PUNISHMENT

You'll own the best farm gate made . . . and the most attractive . . . when you hang an Alcoa Aluminum Gate. They're Horse High, Hog Tight and Bull Strong!

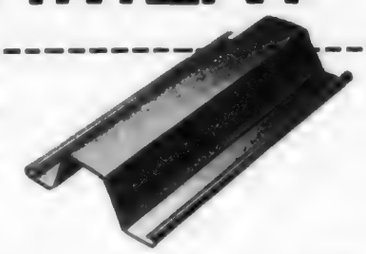
Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

For Exciting Drama Watch "Alcoa Theatre," Alternate Mondays, NBC-TV, and "Alcoa Presents," Every Tuesday, ABC-TV

We'll send FREE sample

Prove to yourself that Alcoa Aluminum Gates are built rugged. Send us this coupon and we'll send you, without obligation, a free, 10-in. section of the sturdy rail that makes the Alcoa Gate the best buy on the market.



Aluminum Company of America
1930-F Alcoa Building, Pittsburgh 19, Pa.

Name_____ ☐ Farmer

Address_____ ☐ Dealer

Post Office and State_____ ☐ Student

RED ROSE COW-Q-LATED DAIRY PROGRAM

Developed for EXTRA Pounds of Milk a Year

Energy packed to pay off in the milk pail and for longer productive life!

The Red Rose COW-Q-LATED Dairy Program makes the problem of more profitable dairying a question of simple mathematics. It has been developed to pay off in the milk pail . . . with the extra pounds that are the high profit in dairying. The Red Rose Cow-Q-Lated Dairy Feeds are protein and energy balanced to maintain the high levels of production that your cows are bred for, regardless of the changing quality of roughage or pasture.

Ask your Red Rose dealer about the Complete Red Rose COW-Q-LATED Dairy Program . . . Prove it through a 6 month test on your herd.

Distributors from Maine to Florida; Ohio to the Atlantic

RED ROSE
GUARANTEED FEEDS
JOHN W Eshelman & SONS
ESTABLISHED 1842
LANCASTER, PA. • YORK, PA. • CIRCLEVILLE, OHIO
TAMPA, FLA. • SANFORD, N.C. • CHAMBLEE, GA.

WATER ON DEMAND
makes the crop...

engine power
BY CATERPILLAR

makes the difference!

When you go to the time and expense of installing an irrigation system, don't shortchange yourself with anything less than the best for your power. Only Caterpillar Diesel and Natural Gas Engines can deliver the trouble-free power you have a right to expect—season after season—with very little attention—and at the lowest over-all operating cost of *any* diesel or gas engine. Cat Engines are available in capacities up to 650 HP, with a wide range of starting systems, heat exchangers, safety controls, etc. Cat Gas Engines with their 10.5:1 compression ratio are up to 25% more efficient than other natural gas units. Call your Caterpillar Dealer for a free irrigation power analysis.

ENGINE DIVISION, CATERPILLAR TRACTOR CO., PEORIA, ILL.

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Illustrated is a portable sprinkler system with twin guns and engine mounted on trailer chassis, irrigating about 2 acres per setting.

STARTS RIGHT NOW!

Torture Tests Prove It!

When you pull the starter rope on a new McCulloch *Number One* chain saw – be ready for action right now!

The small inset photograph shows how McCulloch *Number One* chain saws are torture-tested for dependable starting. Hour after hour, day after day, the saws are started, accelerated, stopped . . . started, accelerated, stopped. One saw was started 57,329 consecutive times, and it was still as rarin' to go as the first time it was started.

Even more starting tests were conducted in the field by hundreds of farmers and professional woodcutters. The results proved that McCulloch chain saws are *Number One* for fast starting.

Try a new *Number One* chain saw at your McCulloch dealer. Seven models to choose from.

ONE/40 Direct-Drive

Only McCulloch gives you so much saw for so little money:
• Weighs only 18 pounds • Lubri-Mac Automatic Oiling
• Direct-drive for fast, light-touch cutting • 3 bar sizes — 12, 18, 24" • Big 2.5 pint fuel tank • Pintail Chain

• As low as **$154.95**

LEADERSHIP THROUGH CREATIVE ENGINEERING

McCULLOCH CHAIN SAWS

Number One In World Sales

For free booklet write McCulloch Corporation, Los Angeles 45, Calif., Dept. F-4

McCulloch Corporation, Los Angeles 45, Calif. • Marine Products Division (Scott Outboards), Minneapolis, Minn.
McCulloch of Canada, Ltd., Toronto, Canada • McCulloch International Inc., Los Angeles 45, Calif.

5-90218

AS LITTLE AS

$2047.00*

BUYS A 1960 MOLINE 4-PLOW TRACTOR

*Jet Star, F.O.B. Factory, optional equipment and taxes additional

COMPARE POWER...PERFORMANCE...PRICE

Only on Moline 4-plow tractors can you get all these advantages:

- **HUSKY 56 H.P. ENGINES**—Moline built for dependable, long-life power!
- **AMPLI-TORC 10 SPEED DRIVE**—Shift on the go!
- **TEL-O-FLO HYDRAULICS**—For steering and automatic implement control!
- **UNIVERSAL 3-POINT HITCH**—Mounts standard 3-point tools!
- **COMFORT-DESIGNED CONTROL ZONE**—For easier, more comfortable driving!

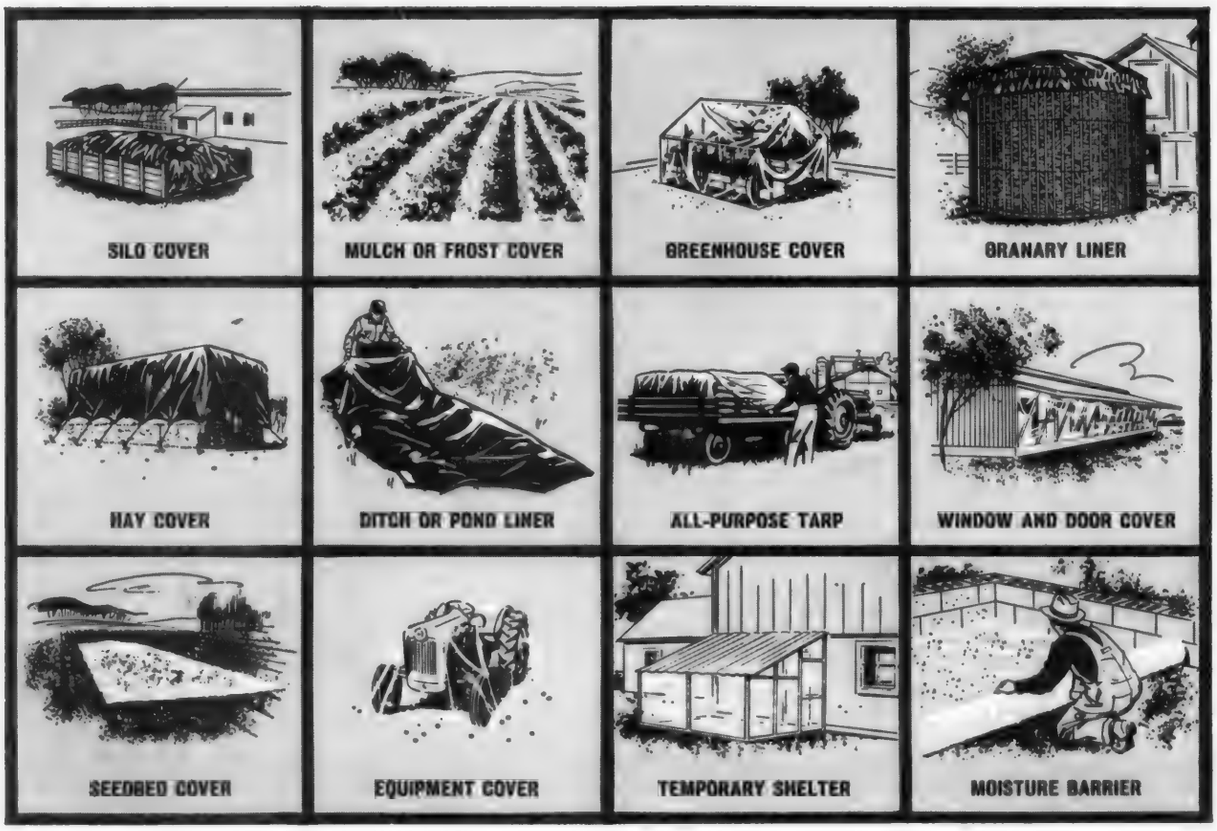
SEE YOUR MOLINE DEALER NOW!

MINNEAPOLIS* MOLINE

First in farm engineering

*Moline Dealers give the Best Parts Service in the Industry.

DOW | POLYFILM
Trademark



POLYFILM... handiest thing since baling wire!

New, low-cost, lightweight plastic ...tough and flexible...resists cold, heat, acid and moisture. Won't rot when buried in the ground.

POLYFILM in the handy dispenser box is available in clear and black; 1- to 32-foot widths; 1½- to 8-mil thicknesses, and up to 1,000-foot lengths.

Wherever you live, you can farm better with POLYFILM® . . . and, it'll more than pay for itself in reduced crop losses, better quality feed and a more efficient farming operation.

This versatile new heavy-duty film is useful in temporary buildings, as weather protection during construction, moisture barriers for new buildings, pond liner—even for homemade swimming pools and ice skating rinks. The low cost of POLYFILM makes it a practical all-purpose farming "tool."

POLYFILM is water resistant—makes an ideal ditch and pond liner, foundation wall sealer; it even floats on water, reducing evaporation from tanks and ponds. Silage can be protected from spoilage by keeping a high percentage of air from entering the silo; seedbeds can be covered and sealed for fumigation.

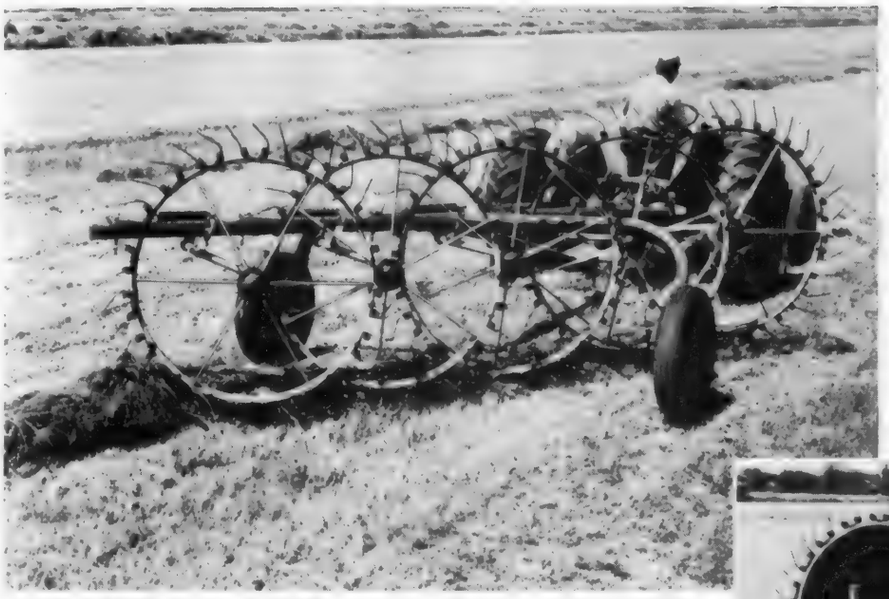
Wind- and rain-resistant POLYFILM makes a practical fertilizer cover, building material or equipment cover. Where prolonged exposure to sunlight is expected, black POLYFILM is recommended. POLYFILM is heat and cold proof—remains flexible to -60°F. Tough and lightweight, a 20-lb. roll of 4-mil POLYFILM will cover 1,000 square feet. Its durability and toughness usually permit re-use, reducing your cost-per-job investment.

Put POLYFILM to work on your farm or ranch today . . . discover the savings possible with this handy farming "tool." Ask your nearby Dow dealer for POLYFILM in the colorful carton which doubles as an easy-to-use dispenser . . . there's a size, color and thickness to match your farming needs.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

The proven Farmhand Morrill wheel-type rake

rakes cleaner, gentler, faster!

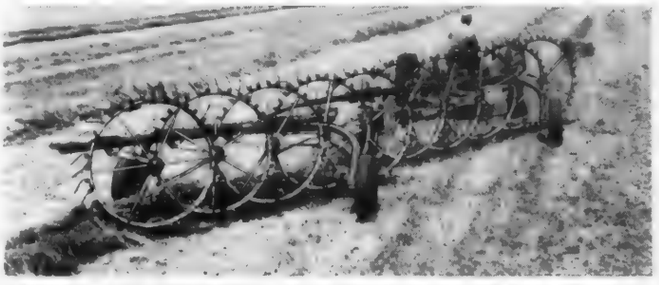


MAKE BETTER HAY—FASTER, with the Farmhand Morrill Rake. Large diameter raking wheels move hay slowly, gently to preserve leaves. Yet, it rakes cleanly at tractor speeds up to 20 m.p.h. It's priced low and it's as simple as an implement can be . . . no PTO, no gears, no belts, no pulleys. It transports at highway speeds. Model M5 has 5 raking wheels, covers 7½′ swath. M6 has 6 raking wheels, covers 6′9″ to 10′5″ swath. By using only rear two wheels, rake becomes an unexcelled windrow turner. Optional equipment includes fingertip hydraulic wheel control, wind shields and tandem hitch.

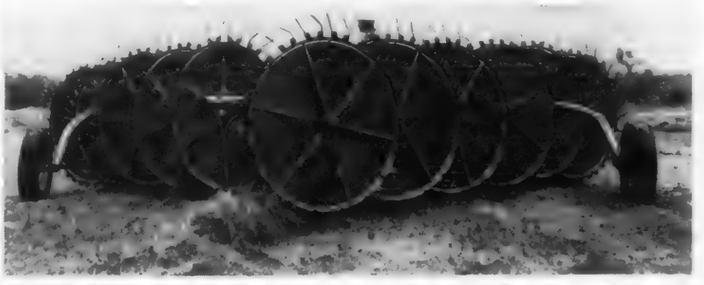
RAKE DITCHES AND HILLSIDES with no slipping or sliding. Rake terraces, borders and uneven fields clean. Raking wheels independently follow ground contours—may vary as much as 11″ from one wheel to the next—so you can rake anywhere your tractor will go. And the raking action is gentle on any ground. Ask for a demonstration.

OFFSET RAKING is easy with the Farmhand Morrill Rake. To avoid driving on unraked hay, it can be offset as much as 8′ to the side and still rake at 100% efficiency. Simple tongue position adjustment is all it takes. No other type rake is so versatile.

Combination units cut raking time in half



TANDEM ARRANGEMENT of two M5 rakes covers a huge 15′ swath. Tractor pulls two units as easily as one. All you have to do is attach a simple tie bar and reverse the tongue on the second rake.



V-TYPE RAKE is a simple combination of one ML5 and one M6 rake hitched to the same drawbar point. Hay from the left unit joins hay from the right to form one big fluffy windrow.

Save up to 30% on bale handling costs!

FARMHAND BALE BUNCHER gathers up to 7 bales in a bunch. When the lever is tripped, bales slide off the buncher. You can make a windrow of bales across the field—concentrate a wagon load within a 100′ area.

CUT 20 MINUTES OR MORE per ton from loading time. Loading is less work, with less driving, starting and stopping. The Farmhand Bale Buncher is built to give years of trouble-free, low cost operation.

Farmhand

FIRST IN FARM MATERIALS-HANDLING

FREE INFORMATION!

Write: THE FARMHAND COMPANY
Dept. FQ-50, Hopkins, Minn.

Please send literature on_____

I am a student, send special material ☐

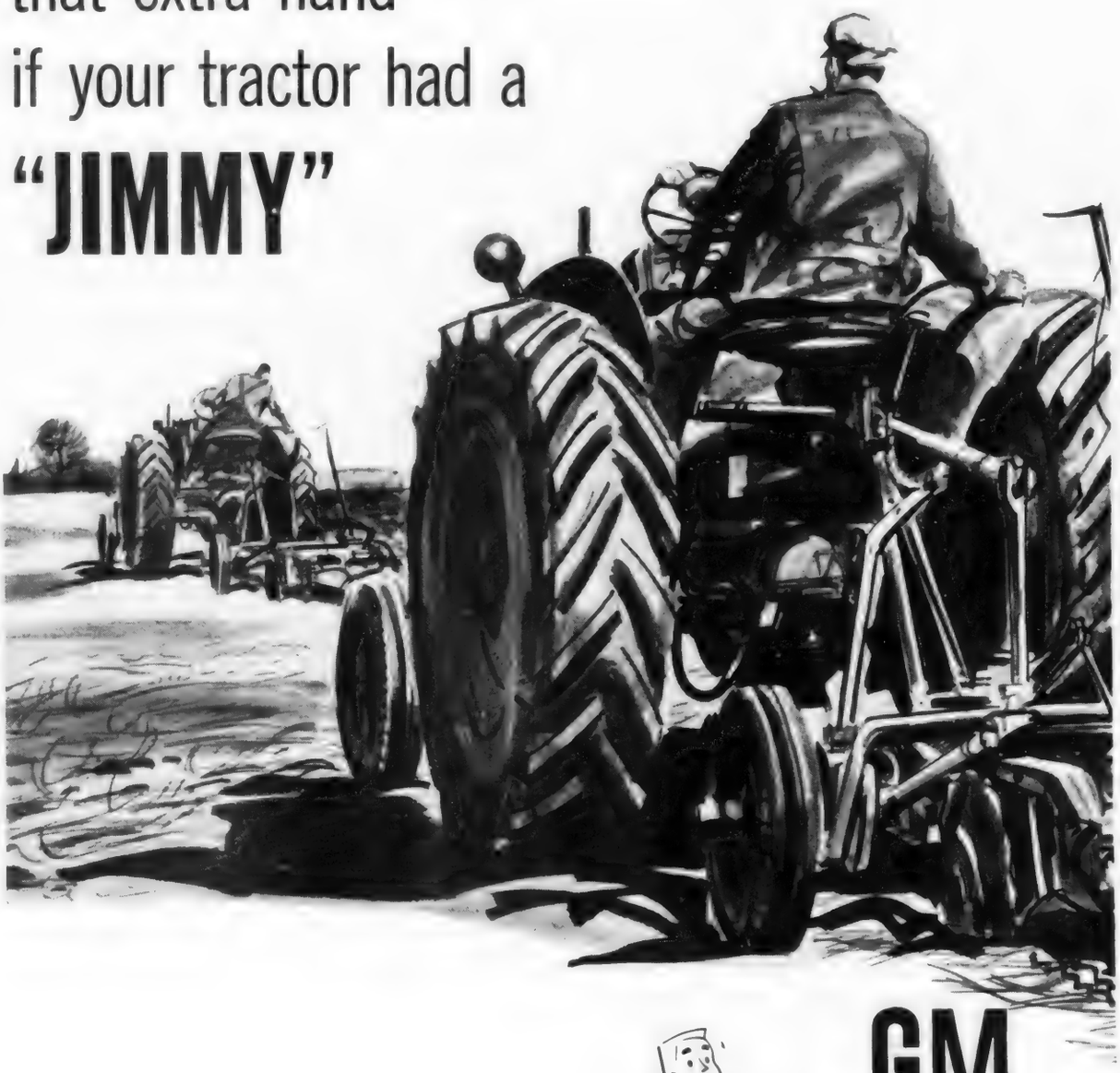
Name_____

Address_____

Town_____ State_____

A Division of Superior Separator Company

YOU wouldn't need that extra hand if your tractor had a **"JIMMY"**



With a GM Diesel in your tractor you'll get more work per man-hour, cut your labor costs. A recent test showed a "Jimmy"-powered tractor could plow 40 acres while another Diesel plowed 31½. *GM Diesel sets the standard of Diesel productivity.*

Write for 4-color brochure describing JOHN DEERE, MASSEY-FERGUSON and OLIVER tractors powered by GM Diesel.

GM DIESEL

DETROIT DIESEL ENGINE DIVISION,
GENERAL MOTORS, DETROIT 28, MICH.

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario
Parts and Service Worldwide

To realize the full benefits of automated feeding

. . . SEE YOUR EXPERIENCED Badger MAN

Good, sound advice *before* you start to plan your automatic feeding system is your best assurance of getting all the advantages automation has to offer—and no one is better equipped to help you plan than your local Badger Dealer. Not only does he have a complete line of quality equipment, but he also has a wealth of reliable information based on installations of virtually every size and type. He will also provide you FREE a detailed working drawing of your proposed lot, with all equipment specified—prepared exclusively for you by Badger feedlot engineers who know first hand the problems involved.

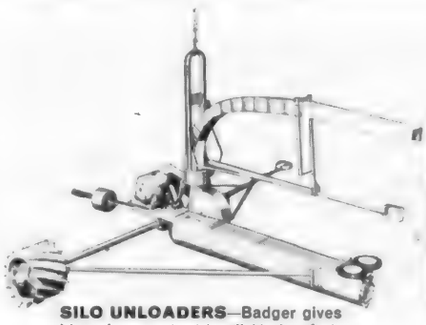
Whatever your materials handling problem . . . Badger Farm-Engineered Equipment is your answer

Badger specializes in farm materials handling equipment. Every Badger product is designed, engineered and manufactured to the special requirements of modern mechanized farming, and is thoroughly tested under actual farm conditions. Whether your present needs call for a single unit to be added to existing equipment, or a complete, fully-integrated automatic system, it will pay you to look to Badger—the single source for all automatic farm materials handling equipment. Every unit is the highest quality throughout—to give years of dependable service.

Badger

PUSH-BUTTON SYSTEMS

- **Take the Heavy Work Out of Feeding**
- **Drastically Cut Feeding Time**
- **Cut the Cost of Feed Handling**
- **Solve Your 'Hired Man Problem'**
- **Give You More Time for Herd Management**



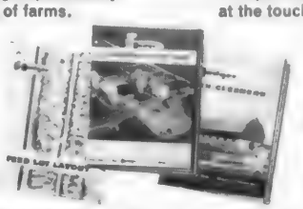
SILO UNLOADERS—Badger gives big volume output in all kinds of silage . . . perfect operation when silage is frozen . . . unfailing dependability proved on thousands of farms.

BUNK FEEDERS—Three proven types: this space-saving Round-the-Silo unit, the ultra-efficient tube feeder, above, or the economical open auger type. Deliver any kind of feed at the touch of a button.

BARN CLEANERS—Badger gives you the most efficient method of removing manure from your dairy barn—the hardest job in dairying. Three models . . . proved on thousands of farms. Badger also builds an efficient, dependable, low cost Poultry House Cleaner.

NEW **FEEDLOT LAYOUT BOOK *FREE***

SEND COUPON TODAY!



MORE FARMERS USE BADGER SILO UNLOADERS THAN ANY OTHER

BADGER NORTHLAND, INC.
Dept. Q—Kaukauna, Wisconsin.

Please send my local dealer's name ☐, and literature on:

☐ **Tube Feeders** ☐ **Auger Feeders** ☐ **Round-the-Silo Feeders**
☐ **Silo Unloaders** ☐ **Barn Cleaners** ☐ **Poultry House Cleaners**
☐ **Feedlot Layout Book**

*Name*_____ *Student* ☐

*Address*_____

*City & State*_____

Now at your FORD Dealer's

New Ford **Falcon** Ranchero

Another first from Ford- a truck that gives up to 30 miles per gallon!
Ford's new Falcon pickup features solid Single-Unit construction with big 6-foot box.
And it not only costs less to buy, it saves hundreds on gas and upkeep!

One look . . . and you know here's a truck like no truck you've ever known! Another look—this time at the price tag—and you know why no other truck can even begin to match its savings!

Fact is, everything about the new Falcon Ranchero is designed to cut costs. Its new 90-horsepower Six is geared to move a real load, yet it delivers up to 30 country miles on a gallon of gas . . . and travels up to 4000 miles between oil changes!

New, Single-Unit construction means low upkeep costs—it's tighter, quieter, longer lasting. Replaceable front fenders (they bolt on) cost less than $30!

The Falcon Ranchero is a great work saver, too. Though the box is a big 6-footer (7½ with tailgate flat), you can reach in to *any* part of the load from the ground. And the tailgate opens or closes with a single one-hand motion!

Finally, there's the Ranchero bonus: smarter styling, smoother riding and easier handling than you'll find in many a new passenger car! Call your Ford Dealer—he'll be glad to bring a Ranchero out for a demonstration. And you'll be glad he did!

• Up to 30 mpg • Comfort for 3 • Bolted-on front fenders • Diamond Lustre finish • Single-Unit construction • Instant-lock tailgate • Lower upkeep costs • Big 6-foot box • Low loading height

Low and compact, there's not an ounce of fat on the Falcon Ranchero, yet there's room for three in stretch-out comfort. And would you ever guess that such a sweet-lined beauty is actually the lowest priced pickup you can buy!

America's Lowest Priced* Farm Pickup

*Based on latest available manufacturers' suggested retail delivered prices with comparable standard equipment.

Newest reason why

FORD TRUCKS COST LESS

BIG NEWS FROM NEW HOLLAND

Hay. . .the one-man way!

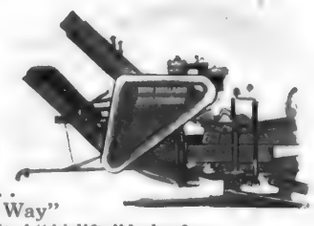
...with the New Holland Super Hayliner 78: Bales big-tonnage crops *fast!*

Rugged in build, dependable in performance . . . the New Holland Super Hayliner 78! Takes the biggest windrows in easy stride!

A glance at its features tells you why: Exclusive Feeder-Assist speeds flow of hay. Famous FLOW-ACTION with exclusive telescoping feeder bar and aluminum tines helps prevent clogging or jamming.

A plunger on rollers cuts power requirements, reduces knife and plunger adjustment. Tractor-Seat Controls give you complete control—right from your tractor seat! And when you add New Holland's tested, proved Bale-Thrower, *one* man can bale all your hay!

Ask your New Holland dealer to demonstrate the mighty "78" on your farm. Compare it with *any* other "big" baler. Then ask him for details on New Holland's flexible financing plans! In twine- or wire-tie, engine or tractor-driven models. New Holland Machine Company Division of Sperry Rand Corporation, New Holland, Pa.



Tested, proved Bale-Thrower makes "Hay . . . the ONE-Man Way" an exciting reality! "Airlifts" bales from "78" to wagon with pinpoint accuracy! Designed for the *mechanical* handling of bales up to 30" long, 45 pounds heavy!

Stock up on New Holland Twines! New BALER-BOY—the low-cost *quality* import twine. SUPER 9, and LONG 10—extra-quality domestic twines for making heavier bales!

NEW HOLLAND
"First in Grassland Farming"

BALERS • MOWERS • RAKES • HAY CONDITIONERS • CROP DRYING EQUIPMENT • SILO UNLOADERS • BARN CLEANERS • BUNK FEEDERS
MANURE SPREADERS • FORAGE EQUIPMENT • FERTILIZER DISTRIBUTORS • COMPLETE CROP-HANDLING LINE • FARM WAGONS • BALER TWINE AND WIRE

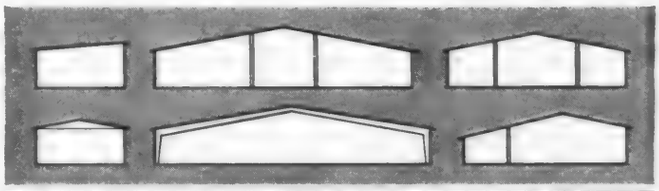
SWEEPING NEW DESIGN FEATURES GIVE YOU MORE IN ARMCO STEEL BUILDINGS

***New* Building Value . . .**
***New* Ruggedness . . . *New* Usability**

Armco's Farm Building line—expanded to include the widest variety of clear-span and column-type buildings—now gives you more than ever before. New structural systems, new sizes, new arrangements, provide Armco Buildings for *every* farm requirement. There's more economy, too. *All* the material in every Armco Building works for you. And you still get the rugged strength that has made Armco Buildings famous.

Here's another extra feature . . . new smooth, modern lines provide good-looking buildings you'll be proud to own.

Mail the attached coupon today for complete information about Armco's new line of farm buildings. Armco Drainage & Metal Products, Inc., 6200 Curtis Street, Middletown, Ohio.



ARMCO DRAINAGE & METAL PRODUCTS, INC.
6200 Curtis Street, Middletown, Ohio

Send me your 8-page brochure on the complete line of Armco Buildings for the farm.

NAME_____

ADDRESS_____

CITY_____ COUNTY_____

STATE_____

☐ Owner ☐ Tenant ☐ Student

ARMCO DRAINAGE & METAL PRODUCTS

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company • The Armco International Corporation • Union Wire Rope Corporation

To Begin With

Whistle Stop

If you think the stories run a little wild as the evening grows late, you should have been around the Indiana Veterinarians' Meeting last winter. A doctor said a rumen fistula was a practical and sure method of curing chronic bloaters in cattle. The method, he said, was justified by several practitioners as a logical preventative measure. It seems a good idea. But, this DVM continued, some sage had suggested, in broad daylight, a further improvement. He would put a whistle in the fistula hole. "When the herd starts to whistle in the pasture bottom, farmer Jones could come running and move them to a drylot before the accumulation of more froth."

Just think of the trouble a boy with a tin whistle could cause.

The Stealthy Season

Summer begins like a new conversation; in sporadic little bursts, promising more to follow. Slowly the clouds slide off the edge of the sky and leave the sun bare and burning like a slow swinging porch light.

The crops gradually lose the light green freshness of spring, and glow with the power of fast summer growth. As you turn from the glare of an early summer day, you feel a warmth through your coat and the back of your hand glistens. It's summertime, lazytime, thirstytime, bloomtime, say the signs, and spring-hatched flocks of untrained young watch their mothers. They learn their part in the gentle game of summer, prepare for the harsh battle of winter.

Lest the world become too lazy, a thunderstorm bursts into the peace, to lay the dust and wash the leaves. When the rain stops, the grass shines crystal green, steam rises from the ruts, and the road dries patchy like a creekbed.

Everything gets sleek and fat in summer except the river. The stream wastes its life away, licking sun-dried sand and stone. Water now is a precious thing, and only the hogs defile it, wallowing until the liquid is an oozing pit.

Summer dies as she begins, slowly, unwilling to admit fall, fighting to hold each plant, starving the tree roots of water so they pass no color to the leaves.

Slowly but inevitably, the stealth of summer ripens into the wealth of fall.

Magazines for Asia

One of the best ideas in a long time was the result of a trip to the Orient by Henry and Sophie Mayer, California grandparents. They saw the tremendous influence of Communist propaganda and wanted to offset anti-American lunges with a more honest picture of this country.

They wrote an Indonesian newspaper, offering American magazines. They were inundated with more than 2,500 requests. On their return to their home in Hollywood, they appeared as guests of a TV program and aired their problem. This time they had 3,000 replies. Their project has grown so they have now organized the sending of tens of thousands of magazines to Asian families. They have requests for magazines from practically every country in Asia, and farm magazines are particularly wanted.

If you want to help, write the Mayers, care of Magazines, Channel 2, Hollywood 28, California. Enclose a stamped, self-addressed envelope. Don't send magazines, but list the ones you could send.

The Mayers reply with an instruction sheet and the address of an Asian family—often with a letter. You ship the magazines direct from your home. They take about six weeks to reach Asia. The cost is about a penny an ounce, sea mail. (FARM QUARTERLY weighs about 16 to 18 ounces.) A goodwill tip is to send an airletter (cost 10 cents) to let the receiver know a magazine is coming. (*Farm Journal* weighs around 10 oz., *Successful Farming* slightly less. *Look* weighs about 9 oz., as does *Life*. The state farm papers, such as *Wallace's, Hoard's Dairyman, Prairie Farmer,* and magazines of this size, weigh 6 to 7 oz. The actual postage is four cents for the first two ounces, two cents for each two ounces thereafter.) The Communists spend billions of dollars a year sending propaganda to Asia. They are not in a position, however, to use the person to person approach we can do so effectively.

Conelrad for Cows

We got a pretty, blue cardboard display from Rural Civil Defense last month. We set it up in the hall. It shows what can happen in an atomic war. It reads "Radioactive fallout can reach your farm." From then on, one gathers, we spend the rest of our life underground getting whiter, living on two weeks' supply of food, and keeping warm by burning the civil defense pamphlets.

Meanwhile, the cows should be in a barn built under three feet of earth. Presumably they are grazing lazily on the ceiling, where the grass roots hang down. The stench down there must be terrific.

In the same package came an article saying the life of this fallout had been estimated by experts before the Senate subcommittee. They said it would lose half its dangerous effects every five or ten years. Who's going to get the manure out of that basement barn every decade or so while we wait for the winds to blow a little less atomic? (If they are right about the ten-year danger.)

A friend of mine went to a Rural Civil Defense meeting the other day. He didn't have a basement or a dugout, he said, so what should he do? "Why, jump in your cistern," said the expert. My friend has eight children. He is also married. Ten people in a cistern has got to be a temporary arrangement. Perhaps they'll wait for the local water carrier to come around and he'll take them in his tank to the local reservoir for a ten-year stay—with all the other families who don't have dugouts.

You can have the cistern. If the bombs come I'm going to jump in the lake.

—J.J.M.

The Dairy Barn

Milk Flavor Purge

The old problem of tangy milk flavors has a new, but partial, solution. A new machine injects live steam into milk under a vacuum and takes out volatile flavors. It works on mild off-tastes due to silage, fresh grass, or feed, and even on light onion or garlic taste. Strong flavors from onions or tangy weeds aren't overcome by the steambath.

Even when off-flavors aren't a problem, the flavor purger gives milk a uniform taste from day to day—a fact parents with finicky children appreciate.

The market milk industry is showing a real interest in steaming out off-flavors, and in some markets, such as Knoxville, Tennessee, all milk is treated regularly.

Farmers selling to an Atlanta dairy said rejects, when they changed feeds or started cows on silage after feeding hay or pasture, stopped after the plant had installed a steam unit.

Semen for Sale

Short, energetic Bernard Rice, his wife, and son operate a 320-acre dairy. Milk from 40 or more cows goes to market in the Fort Wayne area, 40 miles away, but semen from two top bulls finds buyers throughout the continent. The semen enterprise brings additional income and justifies the use of two high priced bulls on this Indiana family-sized dairy.

To expand from local sales of home-processed raw semen, Rice uses the services of artificial breeding associations. The associations dilute, pack, label, freeze and ship the semen. Rice himself collects the semen and handles sales.

The two bulls from which he is collecting are Marlu Dandy Commando, and Marlu Fashionman, son and grandson of Favorite Commando, the number one Jersey sire in America.

"We bought the Dandy Commando bull in 1953," Rice said last spring. "Before that we had respectable bulls, which were never officially rated. I guess they would have made about four stars. Dandy, here, has six stars on his pedigree, and he'll be a seven-star bull when his mother becomes a tested dam."

Ten of Commando's daughters stand side-by-side in Rice's milking line. All of them are expected to outproduce their dams.

The other bull, Fashionman, rates seven stars now—the highest rating the American Jersey Cattle Club gives. His sire has 23 tested daughters which average 11,379 pounds of milk and 599 pounds of butterfat.

Bernard Rice assembles the semen collecting equipment.

Rice collects from both bulls on Mondays. That same day one of the family delivers the semen to NOBA (Northern Ohio Breeders' Association) at Tiffin, or to COBA (Central Ohio Breeders' Association) in Columbus. "We can rent a plane at Portland Airport, and fly to these places and back in an hour," Rice said. "It only costs $25."

He gets a wider distribution of semen at no additional cost by using both associations, since he doesn't have to pay shipping charges if the semen purchaser lives in an area served by an association's technicians.

The associations charge 50 cents per vial—or a minimum of $100 to process and freeze a bottle of semen. Storage costs are another 50 cents per vial. Each bottle of semen can be processed into 300 to 800 vials.

Rice charges breeders $20 per vial for semen. "I feel I can net the most at that price, even though I could make a few sales at $100," he said. When he receives an order, Rice arranges with the Jersey Club for a transfer certificate for each ampule, so the calves can be registered. The cattle club also keeps blood type records on the bulls, so that the pedigree of their get can always be checked.

Mrs. Rice answers the business mail and keeps herd records.

Rice, who learned handling semen in a week's session at the Graham Schools, still inseminates his own cows. He plans to buy a storage freezer to keep processed frozen semen on the farm. A dry ice cooler costs about $130, a liquid nitrogen refrigerator about $540, and an electric unit about $1,500. Rice prefers the electric unit because it's handier and doesn't need a refill of dry ice or nitrogen every two weeks.

To make collections easier and safer, Rice built a stall similar to the type used at the bull studs. He runs a young bull, sterilized by vasectomy, with the cows on pasture to find those in heat.

Rice got his start in semen sales by selling to nearby breeders, home-processed semen, cooled but not frozen. To reach the larger market for frozen semen, he spends $125 a month for a page in the *Jersey Journal*. "I've made some bull sales to South America," Rice added. "The market there looks good, so I'm thinking of promoting semen in Spanish language journals."

Rice and others who operate as he does, save investment in freezing equipment by using the facilities of the artificial breeding associations. A small, automatic unit with preset temperature controls costs about $6,000. Some operators buy this machine, but others share expenses. Three Holstein breeders in Van Hornesville, N. Y., for example, formed the OHM Syndicate, through which they cooperate in processing, freezing, and marketing semen.

Commando's daughters add bonus pounds to the Rice milk tank.

Dairymen near Suffield, Conn., depend on a private technician, Roger Ives. He handles semen from collection through sales.

Whatever their method, these breeders feel that semen sales are a good way to keep a first-rate sire for a herd that otherwise would not justify a seven-star bull.

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YOUR LAWN looks like it's just come from the cleaner's when you step off the new Toro Pony*. No grass clippings in sight. They're snatched up and blasted into the bag the instant they're cut. The powerful vacuum from the full circle "Wind Tunnel" design does it. And this exclusive Toro feature gives you a riding rotary that cuts a 25" swath—outmows any other riding rotary on the market.

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Sportsman* tractor with 32" triple-blade rotary mower—$449.95 complete, $44.95 down. Other attachments available.

Colt has 6-blade 25" reel for smooth scissor-cut on fine lawn. Gives maximum operator comfort. $219.95—only $21.95 down.

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up to 4 rows at ½ the price

The amazing Hesston Corn Harvester on your combine lets you harvest one, two, three, or four rows at a time; shell the grain; shred and spread leaves, cobs and stalks all in one operation. Same header works equally well in all four crops. Has time-proven features that make it the most practical and economical way to harvest corn with minimum loss. Available for 29 models of popular S-P and pull-type combines.

for HAY... Small Grains ... Seed Crops ... Peas ... Mint

it's the HESSTON 220 WINDROWER

saves 293 miles of field travel in 100 acres

The Hesston Self-Propelled 220 Windrower with optional hay conditioner cuts, conditions, and windrows in one, low-cost operation. A 14-ft. Hesston saves you nearly 3 miles of field travel per acre compared to harvesting with tractors, 7-ft. mowers, pull-type conditioners, and rakes. Reduces labor costs by 75%; equipment costs by 50%. Produces leafier, more nutritious hay ... cured fast in airy, criss-cross windrows. Also ideal for cutting and windrowing small grains, seed crops, mint, lentils, etc.

for SMALL GRAINS... Flax ... Soybeans

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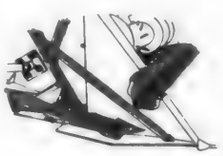
eliminates bunching

The new, streamlined Hesston Straw Chopper chops, shreds, and spreads straw as you harvest! Improves your soil, speeds up cultivation. Free-swinging hammers prevent slugging! Hesston features easy four-point installation — with hammers and concave reversible for longer life. More satisfied farmers use Hesston's free-swinging hammer design, than any other chopper in the world!



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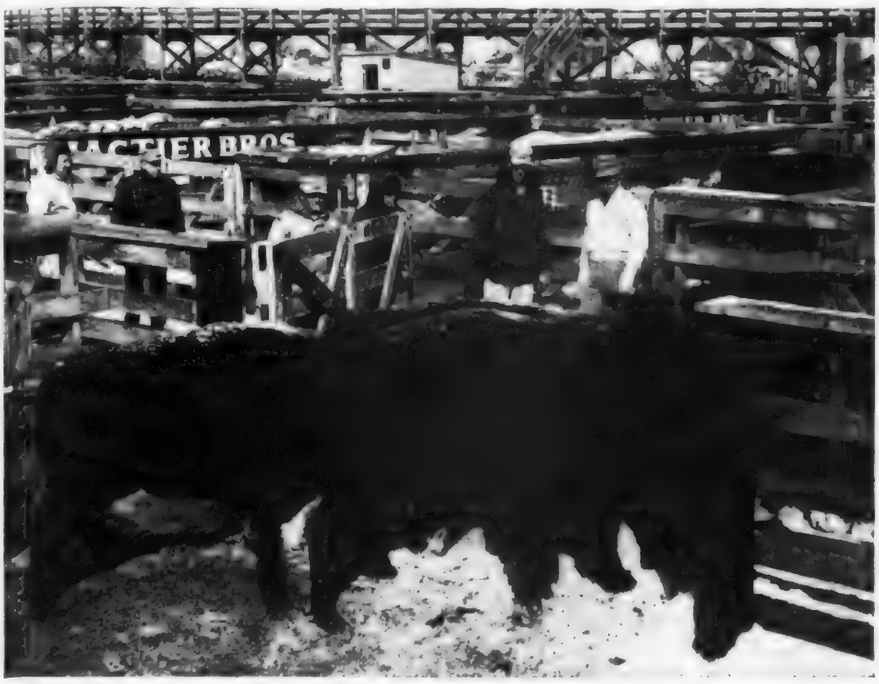
Lilly WATCHES THE "TRADING," BUYING, GRADING OF CATTLE



114-day Stilbosol-fed cattle sell near top

February 24, 1960—Stockyards, Omaha, Nebraska. G. C. Young sees his short-fed cattle sell for $26.00... dress out at 60%.

by Eugene S. Hahnel

Carlton ("Carl") Noyes is described by some as "one of the best young feeders in Nebraska." Carl feeds about 10,000 head of cattle per year in his feedlots and has been in business six years.

"When Stilbosol first came out," Carl explained, "we tried it out on one bunch of cattle and they did far better than we expected. Right there, we switched to feed containing Stilbosol and have been with it ever since.

"Our past records show that we get an average daily gain on steers from 3.0 to 3.25 lbs. Heifers, 2.7 to 2.8 lbs. We figure that we get our cattle to eat 3 to 4 more pounds of corn per day with Stilbosol than we can get 'em to eat without it."

Carl showed us his records on Young's 75 head. Here are the key figures:

Starting weight	**883 lbs.**
Feeding period	**114 days**
Feed per head	**$65.79**
Cost per 100 lbs.	**$20.12**
Selling price	**$26.00**
Average daily gain	**2.9 lbs.**

"We were well satisfied with the gains on these steers," Carl concluded. "Our weather has been terrible this year. Why, since Christmas, I bet we've had 30 inches of snow . . . and this is rough on cattle. They just don't gain like they should—in such bad weather."

Makers of Stilbosol® (diethylstilbestrol premix, Lilly)
HYGROMIX® (*S. hygroscopicus* fermentation products, Lilly)
ELI LILLY AND COMPANY • AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION • INDIANAPOLIS 6, INDIANA

G. C. Young, owner of cattle, Valentine, Nebraska (left). Carleton Noyes, commercial feedlot operator, Noyes Feed Yards, Valley, Nebraska (middle). Allan ("Mac") Mactier, commission man, (right).

G. C. Young and Carl Noyes stop to talk with "Mac" Mactier before trading starts. Young's 75 head of cattle were fed out by Noyes.

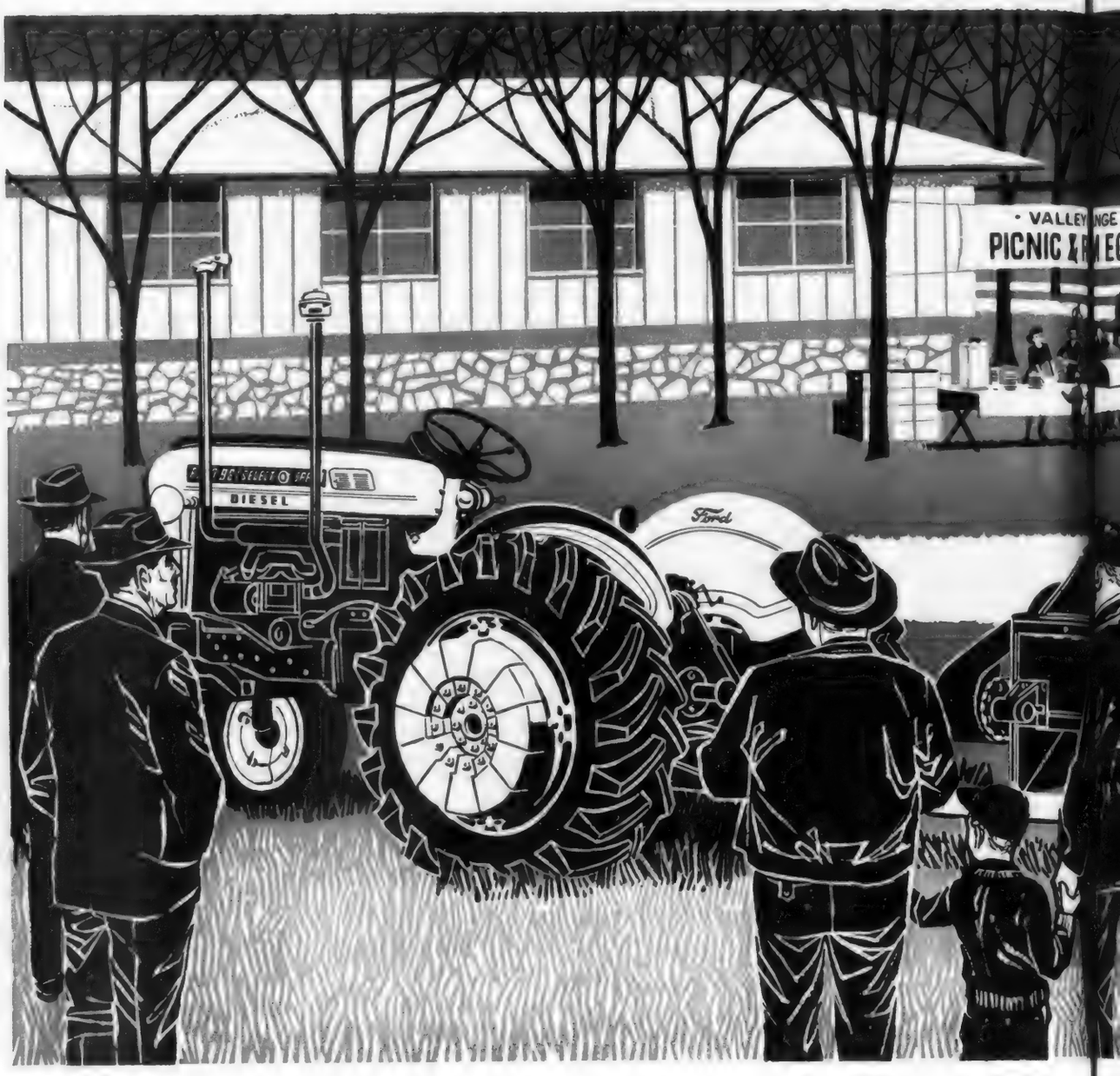
Al Voss, Head Cattle Buyer, R & C Packing Company, Omaha (left). "Mac" Mactier (right).

"Trading" begins promptly at 9:00 A.M. Here, Al Voss and "Mac" start to palaver. "Mac" names his price and Al begins to bargain. A little psychology, a little bickering, a little acting are all a part of the "trading."

Sold! G. C. Young and Carl Noyes watch the cattle as they move out of the pens, on their way to the scales. Young's cattle scaled out at 1210 lbs.

Al Voss (left). Martin ("Marty") Swingley, Federal Grade Inspector (right).

Al watches "Marty" grade Young's cattle in the cooler at R & C Packing Company. Al must mentally estimate dressing percent and carcass grade as he buys. Here, he checks to see just how close his experienced "guesses" are. Young's short-fed cattle graded ⅓ Choice and ⅔ Good.



Ford 981 Diesel tractor; Ford 250 Hay Baler; Ford F-100; Comet 2-door sedan.

Up to 10 tons per hour...
That's making hay the Ford way!

Grange picnic, county or state fair—you'll always find a crowd around a Ford Power Farming exhibit. And here is one of many reasons why—a Ford 250 Hay Baler. Just right for family-size farms, this compact package of hay-baling magic can tie five bales a minute with positive tieing action under most field conditions.

The tractor? It's a fuel-thrifty Ford 981 3-plow Diesel fully outfitted with the latest in Ford farm-proved equipment: Select-O-Speed transmission for on-the-go shifting, independent two-speed power take-off and ground-drive PTO. Rugged as they come and as powerful as they go, Ford's 981 Diesel cuts chore time and fuel bills up to 50 percent and more

Take another example: Ford's F-100 Styleside Pick-up. As easy to load as it is to handle, it's one of a huge line of Ford Certified Economy trucks. And to complete the picture there's Comet, the all-new smaller-size car that accents fine-car styling and luxury, yet is priced squarely with other American compacts.

Next time you're in town, we suggest you visit your Ford Farm Family dealer. Power farming—the Ford way—is the proven route to real savings. Savings in time. Savings in labor. Savings in cost.

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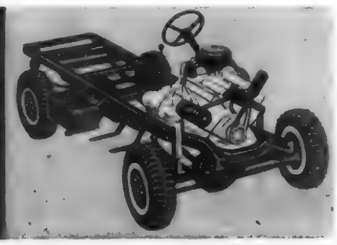
Dodge 4-wheel-drive models are available with rugged Six or V-8 engines up to 202 hp. 6,000 lbs. to 20,000 lbs. max. G.V.W.



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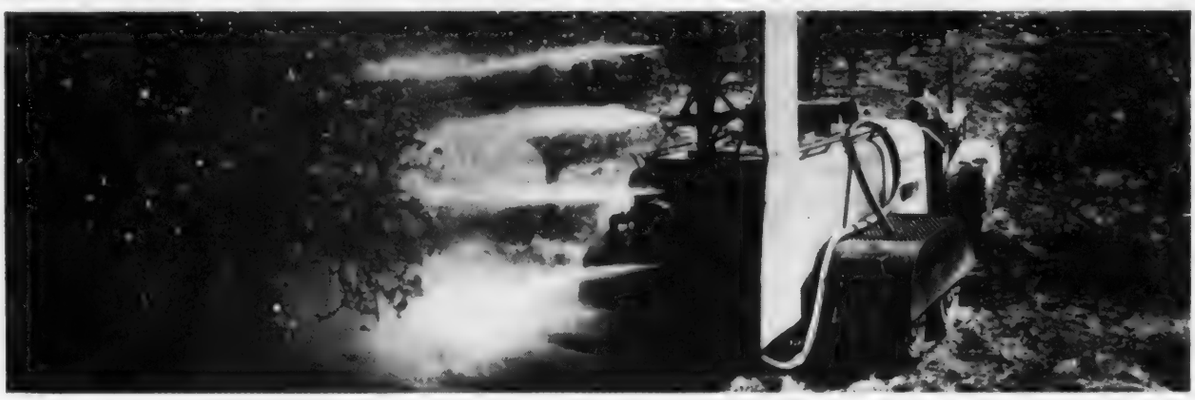

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ED, YOUR HEALTHY, VIGOROUS, UPRIGHT CORN STALKS ON THIS FARM TEST HIGH IN PHOSPHORUS! APPARENTLY YOU HAVE SOLVED YOUR PHOSPHORUS PROBLEM IN GROWING THIS CROP... HOW DID YOU DO IT?
AMMO-PHOS HIGH ANALYSIS, PELLETIZED, WATER SOLUBLE FERTILIZER IS THE ANSWER. I ALWAYS USE AMMO-PHOS ON MY FARM BECAUSE IT GIVES THE CROPS A FAST START AND PROVIDES FOR CONSTANT GROWTH— RESULTING IN EARLIER MATURITY AND HIGHEST YIELDS!
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Safe, convenient, long-lasting! Because Korlan is safe for animals of all ages—newborn included—you can plan breeding for any season without fear of insect attacks. Another advantage—your entire herd can be treated at one time and receive long-lasting protection. In controlling screw worms and horn flies, protection with Korlan lasts about 50% longer than other established insecticides.

Keeps barns fly-free, too! Korlan kills house flies resistant to other sprays. A residual killer, one spraying controls these pests in dairy barns, poultry houses or other buildings for up to six weeks.

Get Korlan—liquid or powder—from your dealer. He has full information. Or write: THE DOW CHEMICAL COMPANY, Agricultural Chemicals Sales, Department 114LT5, Midland, Michigan.

A versatile insecticide, Korlan completely controls a wide variety of pests—and may be applied by spray to beef cattle, sheep, goats, horses and swine. It may also be used as a dip for sheep and goats.

See "The Dow Hour of Great Mysteries" on NBC-TV

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

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. . . made with strong, lightweight, rustfree Reynolds Aluminum provide maximum service with low maintenance

Life-Time Gates are well named. Made by the Life-Time Gate Company, Houston, Texas, using Reynolds Aluminum, Life-Time Gates really last a lifetime! No other material does the job so well over such a long period of time. Gates made of other materials rot, splinter, weaken with age—weather poorly unless painted. Only aluminum provides a lifetime of service with a minimum of upkeep.

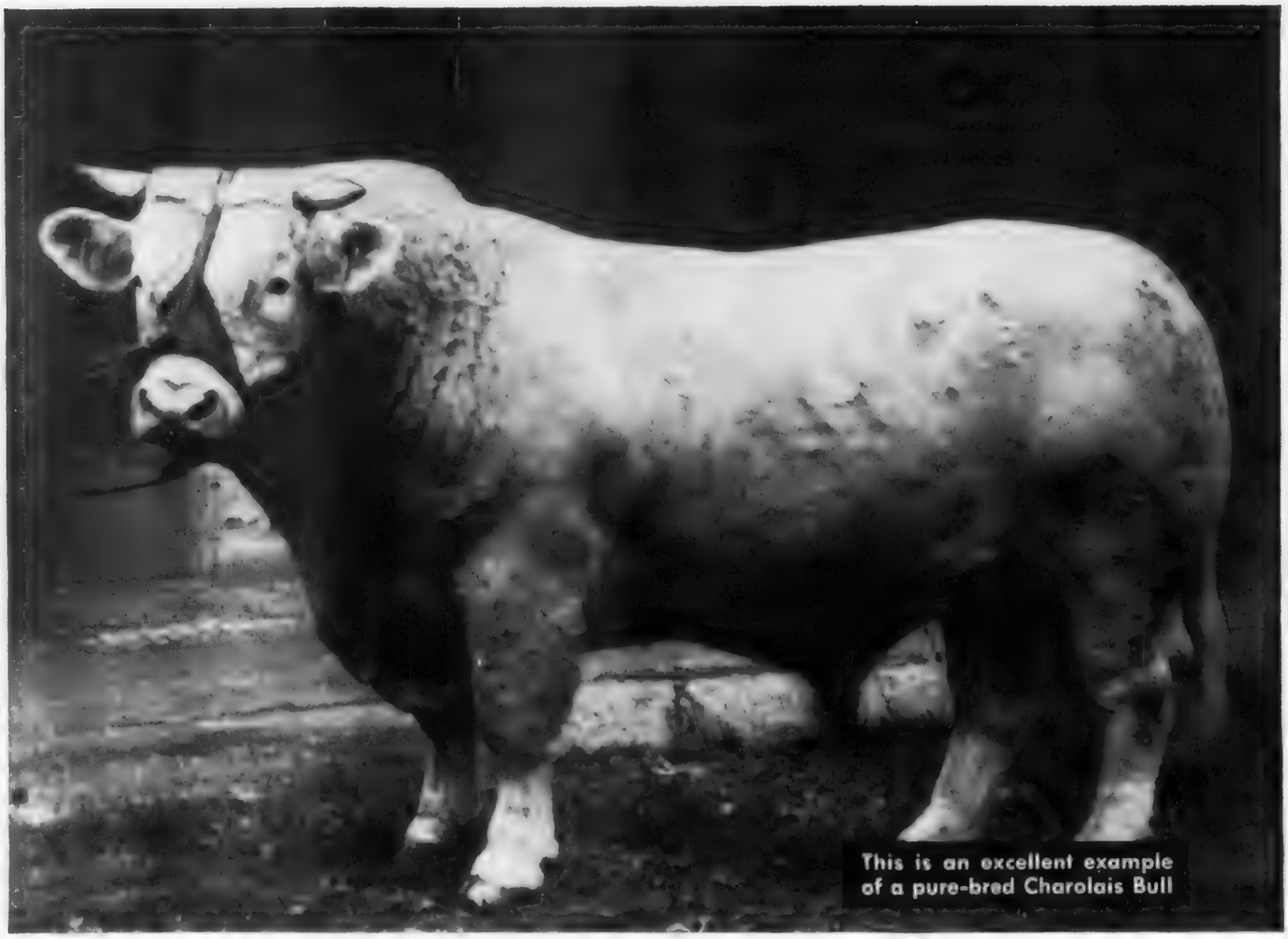
And aluminum is strong! A 12 foot Life-Time Aluminum Gate can support the weight of an automobile, so it's strong enough for the huskiest livestock. Yet this very same gate weighs just 49 pounds—about one-half as much as steel! Thanks to *really* strong Reynolds Aluminum and quality engineering, Life-Time Gates last years and years longer than ordinary farm gates, protect and keep cattle enclosed where you want them.

Look for Life-Time Gates made with quality aluminum, Reynolds Aluminum. For additional information, write *Reynolds Metals Company, P.O. Box 2346-SJ, Richmond 18, Virginia.*

Reynolds Aluminum gives added strength and life to Life-Time truck sideboards. They won't rot, splinter or weaken with age.

Life-Time pen sections are easy to clean, easy to put up and take down, thanks to Reynolds Aluminum.

Watch Reynolds TV shows—"ALL STAR GOLF", "BOURBON STREET BEAT" and "ADVENTURES IN PARADISE"—ABC-TV



This is an excellent example of a pure-bred Charolais Bull

PURE-BRED CHAROLAIS BEEF CATTLE

The largest Beef Cattle on Earth are Revolutionizing the Beef Industry

Remember the initial resistance to hybrid corn, even when it produced more corn per acre? Farmers just didn't believe it. Now most of the corn planted is from hybrid seed.

The same kind of revolution is taking place in beef cattle. Even a small percentage of Charolais blood in a beef animal results in more beef at an earlier age.

The pure-bred Charolais is so big, so beefy and so fast growing, that commercial feeders look desperately for feeder cattle with even a little Charolais blood.

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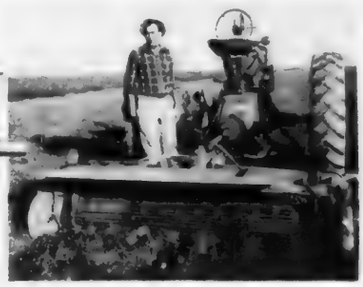

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By Charles R. Koch

Blue Chip Sheep

This Montana ranch uses performance tests to improve an already excellent band of Rambouillets.

LAST FEBRUARY the Williams and Tavenner Ranch in Montana's Deer Lodge Valley sheared its seventy-seventh consecutive wool clip. When the job was finished, the hundred and thirty or so big bags of wool in the loft of the old horse barn told only a small part of the story of the week's work. A very important part was in Nick Bielenberg's records. Sandy-haired Nick, a shrewd, quiet scion of one of Montana's pioneer families is in charge of the sheep department on this highly diversified ranch—there are beef cattle, hogs and a big dairy besides the sheep. He keeps meticulous records on what he calls his blue chip flock of 400 individuals out of the band of some 2400 head of purebred Rambouillets in an attempt to carry over into the sheep business the same kind of performance testing program the ranch has used so successfully in its cattle herd.

The flock is sheared in February. But with big, canvas-topped sheds like these to provide protection from wind and snow the sheep don't mind the cold weather. As co-owner-manager Don Tavenner and his wife, Mary (left), review a recent tour of South American estancias, ranch hands and shearing crew responding to the dinner bell, trek from bunk house to kitchen.

The Williams and Tavenner ranch is a real pioneer in this matter of performance testing in sheep. Few, if any, other flock owners in the west have adopted this tool. But Nick Bielenberg and Don Tavenner, the powerfully built, cordial general coordinator of this family corporation are unanimous in their feeling that the work "is absolutely essential if we're going to stay in the sheep business." (Nick and Don are brothers-in-law. Also active in the ranch management are Lee Williams and Bob Tavenner, uncle and brother, respectively of Don Tavenner.)

Don felt this way when they started the sheep testing work in the spring of 1957. Just before shearing time last winter he returned from a six weeks' tour of South American estancias confirmed in his conviction that the only hope for sheepmen in the States is precision production based upon accurate records, plus some good market years and a government program that will afford the sheepmen of the United States some protection.

"Their wool grading and marketing systems down there are much superior to ours," he says, "largely because of the scale of their operations. I saw flocks of as many as a million head. They were good sheep. And their costs are so much lower. Shearing costs us thirty-five cents a head. Down there you can get the job done for from one to ten cents a head. To meet this kind of competition we need some protection and we're going to have to plug every loophole and cull the poor producers ruthlessly."

And how do you cull the poor producers? Well, first you have to find them. That's where performance testing comes in. "I defy anyone to run a band of sheep through a chute and tell what kind of wool they have," Nick says. "And when it comes to eyeballing those ewes and lambs for production and condition, you can make just as many mistakes."

So three years ago Nick and Don sat down with Paul Orcutt, extension livestock specialist, and some of the other people on the staff of the Animal Industry and Range Management Department and the Montana Wool Laboratory at Montana State College and worked out a detailed testing program. Performance testing work in sheep is complicated by a lot of factors which cause no concern in a cow herd. With cattle the big factor is average daily gain of the calf coupled with conformation.

But in developing quality in a band of sheep the breeder must keep a tight rein on such details as twinning, average daily gain of the lambs, size, conformation and body weight of the ewes and rams, fleece weight, and staple length, density, grade and shrink of the wool. Some of these factors are highly heritable—length and grade of the wool staple, for example—allowing rapid progress to be made by genetic selection. Others, like twinning, conformation and condition, are of low heritability. While selection is of some help here, greater progress can be made by controlling the environmental factors.

Take twinning, for example. It has always been a common belief among sheepmen that the way to promote the rate of twinning is to retain the ewes which have produced twins and select replacements from twin ewe lambs. While this is not to be discouraged, J. L. Van Horn, sheep specialist at the Montana Experiment Station points out that twinning is controlled much more by environment than by genetics. "It is simply a matter of the condition of the ewes at breeding time," he says. "If they are gaining in weight, you get twins. If they are losing weight the percentage of twins will be reduced. That's why we always recommend flushing the ewes before breeding. Put them on fresh pasture, or give them a little grain. This increases ovulation and the chances for multiple births."

Van Horn points to another element which invariably causes the man who merely "eyeballs" his replacements to select against twins. "The single lamb will always be heavier than twins of the same age at weaning time," he says. "So the man who looks only for the heaviest lambs in selecting his replacement ewes will always pass up the twins in favor of the singles."

This is just one of the elements over which Nick Bielenberg and Don Tavenner are trying to gain greater control.

The Williams and Tavenner flock is not large by western standards. But it is a select band maintained for the purpose of producing purebred Rambouillet breeding

With the thermometer warming up to the zero mark Don Tavenner (in cap) stops to check on the hay supply with one of the ranch hands.

stock. The ideal for which Nick is aiming is a long staple, fine wool, mutton type Rambouillet—a dual purpose sheep. And he is determined to produce this model without crossbreeding. With Nick, Rambouillets are a religion. Which is only natural in this outfit, the successor to the old Williams and Pauley ranch which long before the turn of the century was famous for its Rambouillets.

When he started his performance testing Nick had on hand 1000 ewe lambs. His immediate object was to select from this group 400 of the very best. This number gave him enough for a good statistical check without being so large as to make record keeping unwieldly. This top 40 percent of his ewe lambs would be his blue chip flock in which he could measure every variation in the factors he hoped to control.

Lambing begins on the ranch late in March and, as already indicated, shearing is in February, bringing the lambs to their first shearing when they are 11 months old. February seems a most inappropriate time for shearing in this cold climate but there are a number of good reasons for it which will be detailed later.

This first batch of ewe lambs was culled in the spring of 1957 for unsoundness and faults in conformation; points like a short jaw, poor topline, a crooked leg, coarse or britchy wool. As they were sheared each fleece was weighed, and the wool examined for staple length, fineness and uniformity.

With this as a basis for selection the top third of the lambs were branded blue, the middle third black and the bottom third red. They were run together throughout the summer as a dry band. This latter point is of great importance. The select group should receive the same treatment as the rest of the band, so differences in performance cannot be laid to environment.

When the flocks came off the range in October that first year, these yearling ewes were sorted into their respective groups—blue, black and red. Each ewe was weighed and the average weight of each group was determined. This gave a check on the average daily gain of the individual as against the performance of its respective group.

The above-average blues were temporarily held in a separate group (#1); the below-average blues in another group (#2); and the above-average blacks in a third group (#3). Then groups #2 and #3 were combined and 20 percent of this combined bunch was off-sorted or culled for soundness, conformation and quality. Next, group #1 was subjected to the same kind of culling. The selected individuals from group #1 and from combined groups #2 and #3 then were tagged with blue ear tags and became the blue tag (or blue chip) flock. These were the heaviest weighing, heaviest shearing, best looking ewes. The rejects went into the commercial band.

Nick points out that if the desired 400 limit had not been filled after this go-round more would have been added to the flock from the above-average reds. Or, if the select flock had numbered more than 400 at this point, it would have been rigidly culled again to reduce the number.

The blue tag ewes were bred to the best rams available, one ram being turned into the flock for every 27 ewes. At the end of 18 days, one full heat period, the blue tags were thrown in with the commercial band and again handled without distinction.

The following February at shearing time the fleece from each of these ewes was

weighed in the grease, then put through the squeeze machine to determine its shrink and clean weight. Staple length and fineness were also recorded. "The fleece weight is an indication," Nick says, "but I don't pay too much attention to it. I want to know what it will do on a clean basis."

The squeeze machine is a device invented by Prof. P. E. Neale and his associates of New Mexico State University to give a quick approximation of the shrinkage in a fleece and its approximate yield on a clean basis. The fleece is placed in a drum-like container and squeezed by a belt which draws it into a tight ball. The pressure is applied by a torque wrench which releases when sufficient pressure has been applied. At this point an index number is read on the dial adjacent to the drum; and this figure is then referred to in a set of tables to find the clean content of the wool. This method is not as accurate as the more complicated and time-consuming core test, but it gives the wool grower a quick appraisal of his clip and a good comparison between individual fleeces. This, of course, is a vital point in the performance testing work.

About a month after the shearing, the young ewes lambed, and at birth each lamb was ear-tagged and given a number. This number, its birth weight, and type of birth and sex (single ewe, twin ewe raised as a twin, twin ewe raised as a single, etc.) was recorded on the dam's record card.

As is the practice on the ranch with all two-year-olds, none of these ewes were permitted to raise twins. Such an assignment, it is felt, is too hard on the young mothers. The extra lamb in each set of twins is sold to bummers.

When the lambs were weaned the following fall, they were weighed and graded and their weights recorded with reference to the average for their sex. For example, if all the ram lambs averaged 81 pounds and a certain individual made 88 pounds, this would go down on the record as 88/81. "This figure," says Nick, "is in large measure an indication of the ability of the dam. The lamb's potentials show up when its yearling weight is recorded."

As the breeding bands were being shaped up that fall, about 30 percent of the original blue tag ewes were culled to be replaced with selected yearlings. "To make progress you've got to cull hard the first years," Nick says. Eventually, the blue tag band will include ewes of all ages.

Less work has been done with the rams, so far, than with the ewes. Last year 10 bucks (5 selected from the records on the basis of conformation, size and fleece and 5 selected from the purebreds for comparison) were bred to 270 blue tag ewes. This was accomplished by pen breeding, a ram being placed in a pen with each 27 ewes for 18 days. The rams were then taken out for 6 days, after which the ewes were turned out with the commercial bands. The products of these matings were dropped this spring and will furnish the first opportunity for a progeny test. All the while,

At shearing time the number of the ear-tag is checked (left) and written on a slip which is attached to the fleece. The fleece is then weighed by Nick Bielenberg (below) who also checks its grade and staple length.

After it is weighed, the fleece is placed in the squeeze machine (right) where it is compressed for a quick check on its clean wool content. Representatives from the Montana Wool Laboratory take staple samples (below) and core samples (below right) which are taken to the laboratory at Bozeman and run through a series of tests. These tests give a very accurate picture of the amount of clean wool in the clip after deducting moisture and ash content and the amount of vegetable matter and grease in the wool.

the basic testing program is going forward.

Once the ranch has some ram records, Nick feels they will be taking another long step forward. At that point they will be able to use tested rams from their blue tag band on their commercial flock and upgrade everything on the place.

"It's still too early to put an appraisal on this work in dollars and cents," Don Tavenner says. "But we know that eventually it is going to give us heavier and superior fleeces. Even in the best bred animals there is a great difference between the best and the poorest in a band. Our best producing ewes will shear fleeces as much as eight pounds heavier than our poor producers and give us 50 pounds more lamb.

"We know our low producers are costing us money and we'd be better off without them. With this program we are going to find them and get rid of them. Eventually, we'll get increased production from fewer numbers and we'll have a better product which will bring us a higher return."

But performance testing is no non-stop flight to success. "Seasonal differences far override the improvements you can make through management," Nick says. "You may think you're doing fine for a couple of years until suddenly bad weather, a late spring, a dry summer, puts you back right where you were when you started. But then you've got to ask yourself, 'Where would I have been if I hadn't pushed ahead'?"

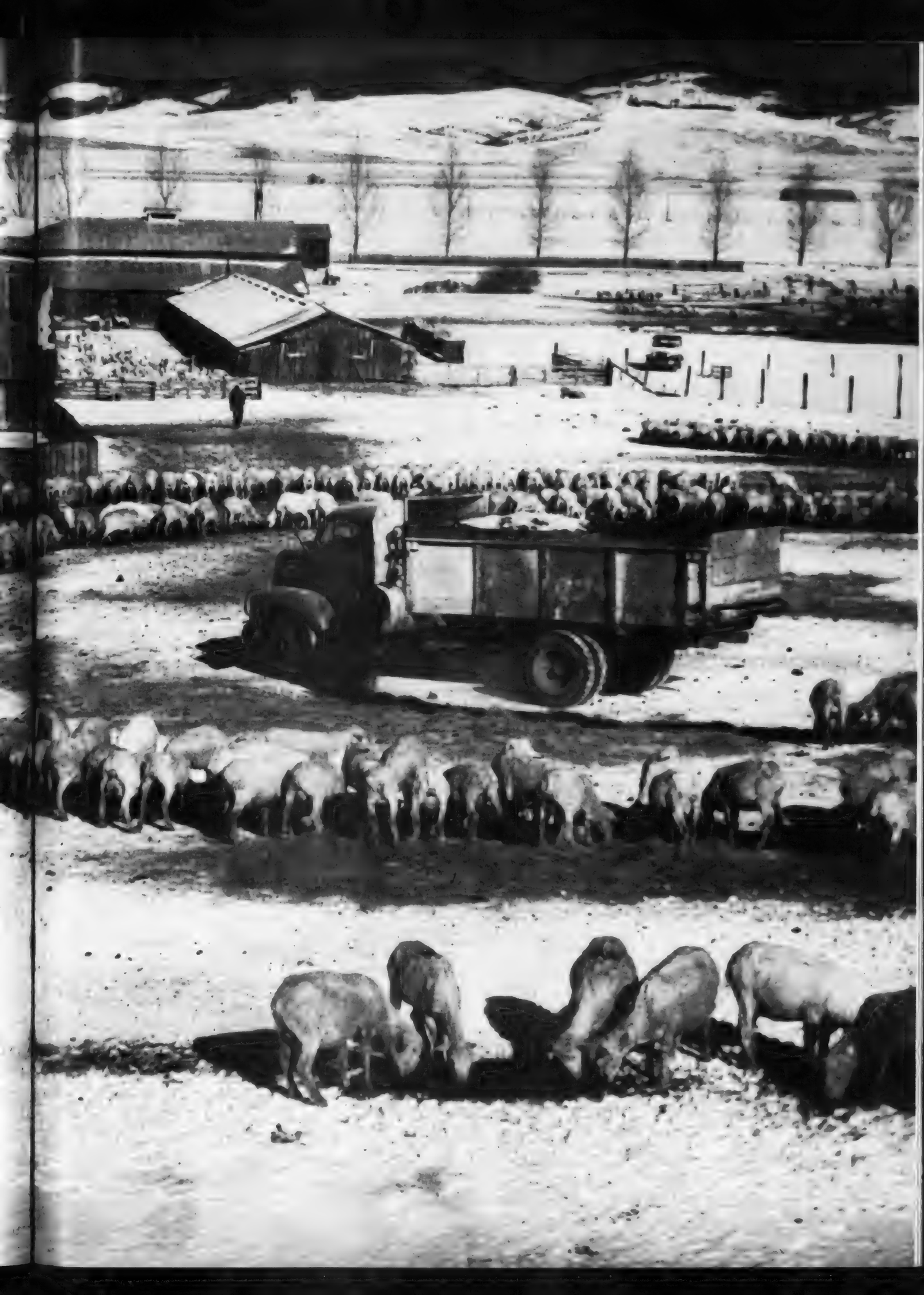
While their performance testing work is the newest tool in the Tavenner-Bielenberg kit, it is just one more factor in a well-rounded program, where every movement has meaning.

Early shearing, for example, was adopted a few years ago for the following reasons:

1) It gives the sheep more time to grow a heavy fleece by December and January, two of the coldest months in that area.
2) The ewe is newly shorn at lambing time. It is Nick's opinion that, feeling the cold more acutely, she is prompted to do a better job of taking care of her lamb.
3) Being less bulky she is easier to handle at lambing time.
4) The weather can be pretty wet and miserable in June, the conventional shearing time in western Montana. Still it is too hot to attempt to feed indoors, a practice that can be adopted in February. The ranch is equipped with tight sheds, each with a capacity of 500 or more sheep, where they can be fed and made very comfortable in the winter.
5) It was always the practice at the ranch to shear the rams early so they would be carrying a heavy fleece at sale time in the fall. To comply with sales rules, shearing of some of the rams must be delayed until after the first of March.
6) In cold weather the ticks drop right

(*Continued on page* 124)

Great, living spirals form in the lots as the ewes follow the feed truck spewing out the highly palatable ration of silage laced with corn.



MEASURING AND MIXING SILAGE AND SUPPLEMENTS

IF YOU FEED silage to cattle, you measure it some way or another, every time you feed, even if you only guess the size of a pile of the stuff.

With grain or concentrates a wrong guess can be more expensive, and most farmers are more careful in measuring this feed.

But whether he uses scoop shovel or auger, bucket or wagon, a farmer has to measure, mix and distribute the ingredients of his feed, and it may be best to mix them before they reach the steer.

The problem breaks down to measuring and feeding—mixing in some cases where it must be a separate operation. There are at least three basic ways to feed, three ways to mix and three ways to measure silage. If you play at math, this gives 27 choices for the whole operation. Twenty-seven is probably on the low side of the ways to provide a balanced feed in the bunk in front of a hungry steer. No two farmers do it exactly the same. But if you know the principles of the basic methods, you can pick the one best suited for your operation—or the goal you will head toward in the 1960's.

Hand feeding, even hand measuring and mixing, competes with any machine until you reach 50 cattle, according to the latest University of Illinois research. From 50 to 300 cattle an automatic feeding system is the most efficient (with labor at $1.00 an hour. If help costs $2.00, automatic feeding may pay for up to 450 or 500 cattle.) For larger groups of cattle, the self unloader wagon is the best feeder—it becomes an economic necessity for extremely large feedlot operations.

These figures assume drylot feeding in a well planned setup. If some pasture feeding is done, or if storage is scattered, or if the cattle are not grouped closely, the feeder wagon will be competitive for smaller groups of cattle. A point to remember, too, is that auger wagons can be used to bring grain or silage in from harvesting to central storage. If you plan to enlarge, it may pay to choose the wagon over the automatic system. It may be the best choice later.

Few farmers can build a completely new system, but when you choose between the costs of the alternatives, remember all the extras. Wagons mean roads between the feedlots, and fence-line bunks. Automatic systems often cause changes in buildings. The wagon system will probably mean feeding is done twice a day. With a pushbutton method, four or five times is feasible at little extra cost. If you believe "little and often" is the way to feed, this is important.

Mixing and Measuring

Silage is the bug-a-boo of practically every automatic weighing or measuring device. There simply isn't any way of doing it that doesn't have some disadvantages. Perhaps because of these problems, there are many top rate feeders who believe the exact measurement of silage is not necessary—they feed silage free choice, or guesstimate the amount the animals can eat in one feeding. They argue an animal should eat as much silage as possible as long as it has the proper supplements of protein, minerals, antibiotics or other medicants in its ration. They measure the supplements, not the silage.

However, if the concentrates are fed separately, a bully steer may commandeer more than his share. Even if each animal gets the same amount of supplement, but widely varying rations of silage, the larger animals may eat too few concentrates.

These problems have driven farmers, researchers and manufacturers to produce silage and supplement weighers to work under farm conditions. They may feed a weighed amount of blended silage and supplement, or weigh each separately, or weigh only supplement. Knowing the advantages

MEASURING AND MIXING SILAGE AND SUPPLEMENTS

Silage can be weighed, measured by volume, or "timed" out of a silo, in that order of accuracy. Supplements can be measured accurately, using three common devices, auger, moving belt and vibrator, again in order of decreasing accuracy

Supplements can be blended with the silage and the blend measured or fed free choice. The supplements may be weighed and distributed separately, with silage fed free choice. Lastly, measured amounts of supplements and silage may be separately fed. Free choice supplement is not ideal.

If a blended feed is distributed by auger, it will be mixed as it goes. A shuttle stroke feeder, belt or a rotating chain feeder will not mix feeds. An unmixed feed may need more bunk space per animal, so each gets his fair share when concentrates are fed. A self-unloading wagon can mix feed as it distributes.

The choice of self-unloading wagon or automatic distribution will affect layout and choice of measuring device. A recent study showed that a farmer with more than 350 cattle in one drylot operation should consider wagons rather than augers, shuttles, or chains.

of each system and weigher will help you choose one for your setup.

Measuring Silage

Simple weighing of silage is one way. Trelawny Farm has such a system. This Ohio farm is described in "Lazy Susan Feedlot" on page 90. The box from a self-unloading wagon is mounted permanently on scales. The silage and other feed ingredients are dumped separately into the box, and unloaded with an auger.

An interesting variation on this system has been made by several handyman farmers. They use a box on scales, but have several arms added to the weighing scales. They use one arm for each ingredient. The weight, say of silage, is balanced on one arm, then a supplement is added, using a separate arm. Throughout the weighing there is a record of the weight of each feed added. It's far more difficult to make an adding mistake, and for small amounts it is more accurate, as each concentrate has a separate, smaller weighing arm.

Measuring silage with a box of known size is a substitute for weighing; less accurate, but probably well within a ten percent margin of error. A common practice is to fill a self-unloading wagon to a known level, and then add the supplement.

The drawback to weighing is the labor involved. A man must be on hand to weigh. It is possible to automate the filling of a box to a predetermined level, but the addition of supplements is far more difficult to do automatically. This "batch" weighing can slow down any system, wagon or automatic.

A second self-unloading wagon adds speed (and cost). With two boxes, the operator can distribute one load while the second box is filling. Another way is to have a stationary unit, which dumps into the wagon. This can be a hopper, or another box, perhaps on scales, mounted high enough to fill the unloader wagon quickly.

Continuous Weighing

Where feed is distributed automatically, manual weighing holds up the flow of silage until weighing is finished. To avoid this several devices can be used, which weigh with little interruption to flow.

The Seedburo Equipment Co., 618 West Jackson Blvd., Chicago 6, Illinois, has an automatic feeder with semi-continuous flow. It is called the Meyermatic, after Lester Meyer, the Stanwood, Iowa, farmer who invented it. Two similar bins hold half a bushel each. They pivot, and when one bin fills, its own weight tips it sideways, and opens a door in the bottom of the bin. In the same movement the other bin is brought into the filling position. One bin is filling while the other dumps. Although the filling is continuous, the emptying is in sporadic half bushels. The Meyermatic counts the dumps, and costs about $120.

The Measur-Matic made by the American Iron Works, 340 Central Ave., Osseo, Minnesota, is another "batch" weigher,

(Continued on page 132)

A shuttle stroke feeder (below), does not mix feed, so James LaBolt spreads corn on top of the silage twice a day. He is not wasting time, as most farmers watch the whole cycle of an automatic distributor. The auger distributor (opposite page) mixes as it distributes, but an open auger will not distribute concentrates separately. They must be blended with the silage. The closed rotating tube auger will handle concentrates separately, or distribute the blended feed. If concentrates are spread separately, more bunk space is needed than for a blended feed.

TOTE BOXES
a new way to handle crops

By Frank C. Beeson

TOTE BOXES ARE MOVING into agriculture. These bins, set on pallets, which are underbeds just high enough to keep the box off the ground and allow the tines of a forklift to slide under, have long been the backbone of efficient warehousing. Now, they are being adapted by modern farmers as an answer to one of their rules for taking labor out of materials handling.

"Don't lift it—let the machinery do the work!" they insist. "Don't even touch it unless you have to. If you must touch it, reduce the number of times it has to be handled. Move it in bulk. Handle it in bigger batches. Make it automatic. Change the size and shape of the container to make automation possible."

These new principles of materials handling mean certain death to some of our traditional farm containers—the wooden apple box, the potato sack.

But the death of one gives birth to another—the palletized bin.

Palletized bulk bins, alias tote boxes, alias pallet bins, or just "bins" for short, are pallet-mounted boxes. They can take many shapes and sizes, a common one is 47 inches square and from 24 to 33 inches high with a capacity ranging from 25 to 33 bushels.

They have been used successfully to harvest potatoes, beans, grass seed, rice, peas, tomatoes. Their ultimate possibilities have not yet been exploited. The most practical application of bins thus far, however, has been in the harvest of orchard products.

In fact, one of the most rapid developments in the fruit industry in many years has been the almost abrupt change from the use of standard wooden shook apple boxes to pallet bins in the harvest of apples. A less spectacular change is going on in the harvest of pears, peaches, plums and tree nuts.

Bins have been used on a limited basis in the apple-producing districts of Michigan, and to some extent along the eastern seaboard, but only recently has the idea gained momentum to the point that it represents a major trend in the harvesting methods.

Pallet bins were introduced to the Washington State apple harvest in 1957. That year, only 25,000 bins were put to test. By 1958, the number in use had jumped to more than 160,000, and was roughly double this in 1959. Statistics compiled by the USDA revealed that over five million standard apple boxes of Washington apples, plus more than 400,000 bushels of other fruits including pears, peaches and prunes, were harvested in bins in 1958. It is estimated that 35 percent, perhaps 40 percent, of last year's crop was harvested into tote boxes. Washington fruit growers have made an investment conservatively estimated in excess of $2 million in the new containers.

Growth of pallet bin use is also evident in California and Oregon. Although accurate figures as to the number of bins in use in these states are not available, it is estimated to be over a half million. A significant example of the trend is the 17,000 fir plywood bins used by the member farmers of Tri-Valley Packing Association in Northern California. Similarly, more than 900 bins will be used for the first time this year in the pear and peach harvest in southern Oregon's Medford area.

Why all the fuss and rush about simple boxes? The answer is just as simple—cost saving, efficiency. Handling fruit in bigger batches saves money. It saves in materials costs, too. Investigations at the Tree Fruit Experiment Station in Wenatchee, Washington, by Washington State University and the USDA have shown total savings from 6 to 8 cents per bushel of apples harvested. Labor savings, according to the report, for moving fruit from the orchard to the packing plant, ranges from 17 to 25 man hours per 1,000 bushels, or 3 to 4 cents per bushel.

In addition to the savings realized in labor costs, picking container costs are from 2 to 3 cents less per bushel when bins are employed. The choice is the depreciation between picking lugs at about 60 cents per bushel capacity and bins at from 35 to 40 cents

(*Continued on page* 122)

An old lug has no appeal for an apple picker after she has used the new tote box. Picking into bins is like getting a 10 percent raise. Easier handling with a forklift in the orchard and at the packing shed is the key to the palleted bin's popularity with orchardists. The USDA figures the savings total 6 to 8 cents per bushel over lug harvesting.

The Weather Eye

Cloud Chart by Louis D. Rubin

PREDICTING THE WEATHER has come a long way since farmers had to depend on their corns and bunions, crickets, the groundhog, and a wet thumb to inform them when it was safe to cut a field of hay. There has always been a good deal of talk about the weather and nothing much has been done about it, as Mark Twain once observed. There is just as much talk about the weather today and no more can be done about it than was done in the time of our grandfathers. But we can predict what it will be in a more scientific and accurate fashion today, and the problem of reducing weather forecasting to an exact science is being solved.

Forecasting today is a science; it is done by professionals, and there's no voodoo about it. The farmer gets the day's weather from his newspaper or from his radio. It comes from highly trained meteorologists scattered all over the world and is put together by very complex methods of analysis. It is not always accurate—not because the weatherman is guessing, but because there are so many factors that can knock a forecast into a cocked hat. Some of these factors are as fragile and temperamental as Maria Callas and almost nothing can be depended on to do what is expected of it.

The meteorologist sits at his desk, goes over his reports from all over the world, and puts the local report together. He tells us we will have a fair, fine day tomorrow and 15 minutes later a wind shift in the Arctic will start rain, wind or a blizzard on its way to our locality. Weather, therefore, is often a matter of the best-educated guess for a particular spot in time; and the weatherman, however right he may be at the moment, should not be blamed for the vagaries of a wind current a thousand miles away.

The professional weatherman has roughly six different strings to his fiddle. These are (1) the barometer, or pressure systems; (2) temperature distribution; (3) cloud distributions; (4) wind; (5) actual weather that is occurring; and (6) humidity. He puts these all together and comes up with a forecast for a period of time —usually 24 hours. These forecasts, as they appear in the newspaper and on radio, usually cover a wide area. Oftentimes, however, these forecasts are several hours old and that arctic wind may have shifted things around—sometimes several states in extent. The weather, while keeping within the pattern, may vary widely in some localities within the area forecast. The farmer can supplement and verify the published weather forecasts by observations of his own. Within limits he can be his own forecaster. Indeed, some of the old weather signs like red sunsets and halos around the moon, which we sometimes lump off as pure superstition, have sound basis in fact.

He can use the same tools as the meteorologist in fashioning his own weather forecast. One of the best is the barometer. Briefly speaking, a change of weather is indicated by a change in the barometric pressure. If the barometer is falling, the weather will change, usually on the bad side with precipitation. If the barometer is rising, fair weather is likely. The barometer alone is an erratic prophet, but when teamed up with wind and clouds is fairly reliable. While clouds are the by-products of a front, some formations do indicate what is going to happen within the next 24 to 48 hours—if they are viewed with the wind direction in mind, the state of the barometer, and the actual weather at the moment.

The meteorologist always keeps one eye on the wind. The prevailing winds over the bulk of the nation are mostly from the West or Southwest. This is because we are in what we call the belt of westerlies. The polar easterlies are to the north of us up to the Canadian provinces, and the tropical easterlies (trade winds) are to the south of us, south of Florida. The tropical easterlies meander into the southern Gulf states during the summertime. In general the weather across the country comes in from the Northwest, West or Southwest. It varies occasionally, because of topography or other factors. Unusual pressure areas may even bring a storm straight out of the West. You might be in a valley or behind a range of mountains and that would channel the winds naturally from a different direction. Usually a steady wind from the West will bring moisture with it.

New Tools in Forecasting

The space age has brought its benefits to the forecasting business. While meteorologists knew of so-called jet streams, rivers of air at 30,000 to 40,000 and at 120,000 feet altitude, of terriffic speed, which race around the earth in the stratosphere, they were never able to make much, weatherwise, from the information until the speed and direction of the jet stream could be measured. The jet plane, able to climb to great heights, and radar, which could track balloons above the clouds, have supplied valuable information to the weatherman. The lower jet stream and the various high latitude wind currents have a definite effect on the weather and can now be better studied and evaluated.

The radar has been a great boon to the forecaster, for with it approaching moisture clouds and other atmospheric disturbances can be picked up and interpreted. The usual radar screen used by the radio stations and meteorological stations can see about 120 miles from the point of origin For example, the Cincinnati WLW radar can reach out over most of the states of Ohio, Indiana and Kentucky. The radar screen makes a complete turn every 6 seconds, throwing its high frequency waves across the region. When these beams hit a drop of the rain they bounce back and are registered on the radar receiver as beams

(Continued on page 127)

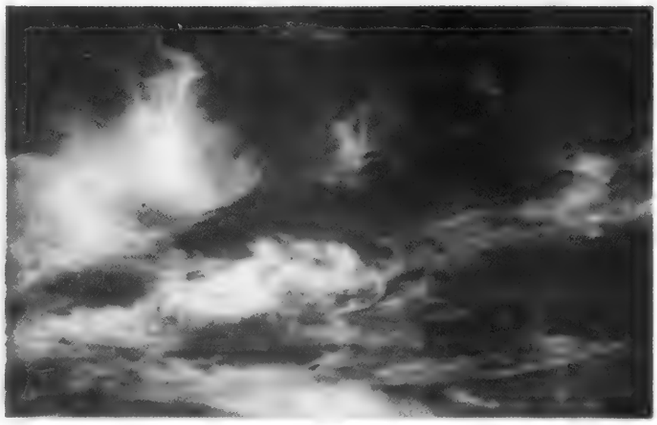
This is the red sunset that usually presages a clear day. A red sunrise indicates the opposite. The brilliant colors come from the sun shining through dust particles rising in the distant air masses.

The Weather Eye

The old-time weather prophet was part witch doctor, part home-made scientist who used assorted natural phenomena to bolster his guesses about the weather. He did not hesitate to forecast the weather a year in advance, a piece of brashness deprecated by the modern meteorologist. Using scientific methods, complicated equipment, and the help of colleagues all over the world, the modern weather prophet finds it difficult to forecast the weather accurately more than 24 hours in advance. The U.S. Weather Bureau publishes four 24-hour weather forecasts each day and three times a week a five-day approximation. These forecasts are available through newspapers or radio stations but a farmer who wants more immediate information may call the Weather Bureau and avail himself of a public service. He may also supplement the general reports of the Weather Bureau by using his eye to observe the clouds, winds, pressures, humidity, and temperatures, the vehicles of the meteorologist, to gain on-the-spot information of what he can expect in the way of weather—at least for the next few hours—on his own farm.

Turn page for weather prediction from clouds.

How to read the clouds



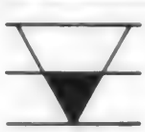
CIRRUS fibratus—Ice clouds. Good indication of rainfall coming into the region; similar to halo around the moon or sun. Look for rain if clouds are coming from direction of source of moisture for the area and they continue to increase in density and to lower.

CIRROSTRATUS—This is also an ice cloud and a development of Cirrus fibratus in that it has lowered and thickened. This development of Cirrus fibratus usually covers most of the sky. Precipitation, either rain or snow, can be expected within 15 to 24 hours.

ALTOCUMULUS undulatus — This formation indicates great bands of high moving air. These bands indicate the way the wind is blowing in the upper atmosphere. Precipitation likely if wind holds steady from southwest or west in the Northern Hemisphere.

CUMULUS humilis—This is a fair-weather type of cloud and normally indicates continued fair weather unless it continues to build up into a vertical column. It then develops into a thundercloud and you can look for an afternoon thunderstorm during the warm months.

STRATOCUMULUS opacus — Indicates warm air overrunning cooler air. If this cloud is moving from the south the duration of rainfall will be 24 to 30 hours, decreasing in proportion to the angle of approach to the source of moisture in your particular area.



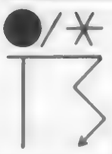
STRATUS—Lowest of all clouds. When the cloud is below 50-foot level above ground it is called fog. Normally a fog burns off before 10 in the morning and will lead to a fair-weather day. This is the type of cloud that causes a dew and "no rain will come to pass."

for their weather warning

CIRROSTRATUS—A Cirrus-type cloud made up mainly of ice crystals. The sun or moon filtering through the crystals produces a prismatic effect of the halo. As the cloud lowers the halo enlarges and becomes a corona. Precipitation is likely within 15 to 24 hours.

ALTOSTRATUS translucidus—This is a Cirrostratus formation, but lower, and it usually produces a corona, which is larger than a halo and has a red spectrum. Precipitation is on the way. The corona may be faint, the sun appearing to be behind frosted glass.

CUMULUS congestus—This is a further development of Cumulus humilis and indicates violent currents have begun moving in the cloud region. Usually this cloud forms about 11 o'clock in the morning and you can look for a thunderstorm by midafternoon.



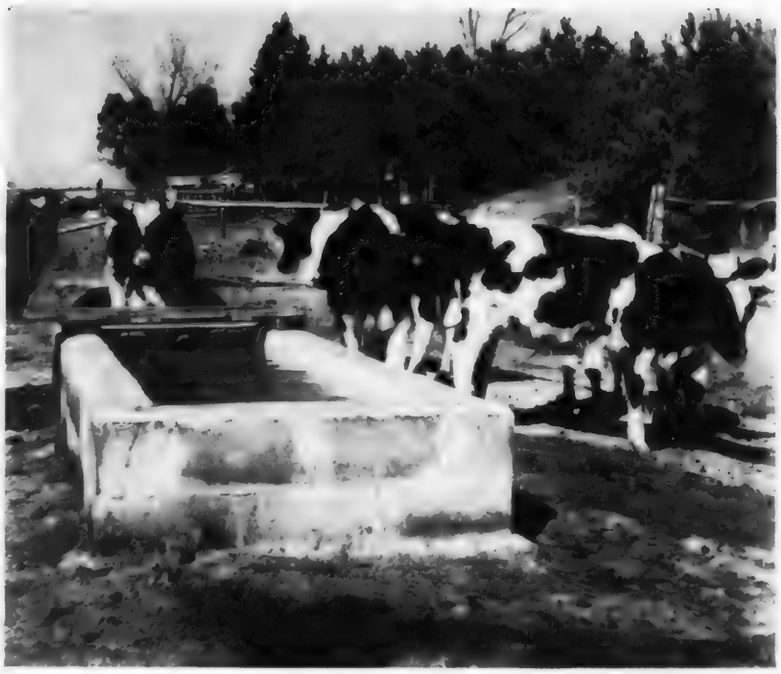
CUMULUS calvus—This cloud is about ready to pop into a thunderstorm and will produce lightning and gusts. Count the seconds from the time you see lightning until you hear thunder. Divide the number by five and you have the distance of the storm in miles.

NIMBOSTRATUS—This formation is similar to Stratocumulus opacus, but it has developed vertically and indicates precipitation of quite long duration. This form is seen in all seasons. In winter it may eventually develop into a blizzard or snowstorm.

CUMULUS fractus—These are fair-weather clouds broken up by strong winds. No precipitation is likely unless the wind holds steadily in one direction for a continued time. These clouds usually race across the higher heavens and presage a storm front on the way.

Pastures for Calves

Southern stockmen are teaming winter pasture with small calves to cash in on their climatic advantages.



With one of his "cowboys" Rutland Cunningham, northern Alabama dairyman and plantation owner (opposite page), inspects some of the 1300 head of calves the Cunningham Plantation ran on oats, ryegrass, crimson clover pasture last winter. The water trough (above) was designed by Weakley Cunningham. It is simply two layers of block on a concrete slab. The inside is coated with a water-proof material.

THE CUNNINGHAM BROTHERS, Rutland and Weakley, operate the 1800-acre Cunningham Plantation on the north bank of the Wilson Dam Lake near Florence, Alabama. They have a dairy there and they do quite well with it. But the most fascinating thing about the place is the way they utilize winter pasture with calves—real little fellows—which they either sell as stockers in the spring or which, in the case of some of the Holstein heifers, they carry on for replacements in their milking line. Their pastures are generally winter oats, rye grass and crimson or button clover.

Rutland, the elder brother, is a lanky, rawboned type with deep-set eyes, a prominent nose and close-cropped grey hair. Weakley, just a little stockier and less angular in his features, wears glasses which set off a warm smile.

Also prominent in the cast of characters at Cunningham Plantation is Andy Barnett, stocky, dynamic idea man, former county agent of Lauderdale County, and now a dairy inspector for the State of Alabama. It was Andy who "encouraged" the Cunninghams to go into winter grazing. The Barnett type of "encouragement" is what some folks might call pushing.

"We'd been doing this kind of thing around here for years," Andy explains, "but I had always considered it more or less luck that we got away with it. Then four or five years ago I ran across some reports on how this fellow Marshall McCullough was raising dairy calves on pasture over at the Georgia Experiment Station. That proved this idea had a good, solid scientific basis behind it and I went all out encouraging our local farmers to develop their winter pastures and capitalize on them with calves.

"Calves put on red meat instead of fat and that makes for cheap gains. You can get more pounds per acre from calves than you can from cattle of any other size.

"Rut and Weakley are always receptive to new ideas and I knew this would be a natural for them."

Today, Rut and Weakley are among the South's most outstanding promoters of the winter pasture and calf team.

Visitors to the Cunningham Plantation, and there have been scores since word of the success of the calf program got around, are taken into the office for a briefing before they go to the fields. The office is a big, square room in a log cabin. A rugged stone fireplace dominates one wall. A towering, antique walnut bookcase stands in a corner, affording a safe resting place for an up-to-the-minute set of farm records. A completely anachronistic electric chandelier hangs from the ceiling and a telephone is the focal point on the top of a cluttered desk by the window. A swivel chair stands by the desk with three or four well-aged and comfortable rockers at hand for the use of guests. A steel engraving of Robert E. Lee looks down from one wall; Stonewall Jackson commands another. Make no mistake about it, this is the South.

And this particular program is strictly southern in its application. "This county," Andy Barnett warns, "is just about as far north as you could get away with it." But that still leaves the entire Southeast to which it offers its advantages; and the way the Cunninghams have adapted their management techniques to capitalize on this advantage is an example for livestock men the country over.

"The one big advantage we enjoy down here is our mild winters," Rutland says for the partnership, as he sinks into one of the rockers. "In summer we're limited by a lack of water. Eighty years ago Henry Grady, one of our southern journalists, said, 'The South will prosper when her fields are green in winter.' He was absolutely right. And that's what we aim to do here—keep our fields green in winter. That way we can compete with any region in livestock production.

"The West took our cotton away from us. That doesn't bother me a bit. To me, cotton meant just a bunch of dirty kids around a cabin. But if we'll handle our winter pastures right we can raise livestock in competition with any region.

"But that means," Weakley points out, "that these pastures can't be given a secondary place in management. They must come before everything."

Then the story unfolds. The first time the Cunninghams gave winter grazing a good try was in 1956-57. They put 69 Hol-

stein calves on pasture that year, the calves being 6 weeks to 2 months old when they were turned out. The project was an immediate and unqualified success.

The calves were given a little supplemental feeding along with their grazing and they gained consistently a pound and a half a day from October through April. Only two of them were sick at any time, a mild case of scours, and none died.

Fifteen of the heifers from this group were carried on into the milking herd. By the end of their first lactation (June, 1959) their milk production had averaged 1,000 pounds better than that of their sisters of similar age raised according to more conventional methods. The herd average was 11,000 pounds.

In the fall of 1957 another bunch of dairy calves was turned out along with 196 beef type calves of an average weight of 230 pounds. The latter calves were purchased, and here the project met its first setback. A 15 percent death loss narrowed the profits on the purchased calves though the homebreds again went through the winter with no trouble.

The winter of 1958-59 saw 825 beef type calves turned out on the Cunningham pastures. These, like their predecessors, were very small when bought, averaging only about 225 pounds, but through careful handling they fared much better than those of the year before. Death loss was held to 10 percent and the Cunningham books showed a net profit of $18,356.97 on the calves after deducting all expenses and charging to the project 30 percent of *all* overhead costs for the entire farm. The latter item included interest, depreciation, taxes and insurance on a big investment in buildings and equipment much of which had no bearing at all on the calf project. Nevertheless, it was felt that it was better to err with a conservative reckoning than to give too bright an impression.

Five hundred acres was more than enough pasture to carry the calves. On this basis the grazing paid off at the rate of $36 per acre net, exclusive of any credit for the silage, hay and seed crops which the Cunninghams consider a by-product.

The past winter the project was expanded to 1,300 calves, and death losses have been reduced to 7 percent. The final figures are not yet in, but barring an unforeseen break in the cattle market the prospects for profit are better than ever.

The Fine Points

"Timing is of the essence in this program," Weakley begins when pressed for details. "A lot of farmers down here have tried winter pastures and have never gotten very enthusiastic about them. The reason is they never prepare them in time. They start making their seedbed after we have sowed and the pastures are never ready for grazing until late in the fall. Last year our pastures were ready the first of October. This was unusually early, but we always have calves grazing by October 15."

The Cunningham timetable is as follows:

Land preparation begins in June, not later than the twentieth. This rules out any temporary summer pasture on the fields which are to be used for early winter grazing. "If you're going to make this system work," Weakley points out, "you can't

(*Continued on page* 107)

CALLING ALL HOGS

HOG CALLING, once the noblest of American arts, has withered on the vine and is all but a goner today. No longer, in the quiet of the summer evening, does one hear the stirring chorus from the barnyards of the countryside, calling the hogs from over the hill to their feed of corn on the cob. From the modern barnyard comes only the harsh clash of gears, the whine of an electric motor. Progress has dealt the deathblow to hog calling; the self-feeder has pushed the hog callers and their evening concert into limbo.

Feeding the hogs was the last chore of the day, coming at that hour when all nature is preparing for a night of rest and quiet. The husbandman has come in from the fields, the horses are fed, the cows are milked and the hens settle themselves on the roosts for the night. Then the farmer goes to the corncrib for his last chore; he raises his head, takes a deep breath, and on the quiet evening air there swells the hog call, more beautiful than any yodel, its notes more entrancing even than the song of the oriole.

Others join him from far and near. There is the manly tenor of young Joe Sparks from the neighboring farm. From the Smith place a mile or more up the valley comes the rich baritone of old Lon Smith, and high above all sounds the sweet contralto of that Helen Traubel of the fields—Mrs. Lolita Hines, a widow—who must perforce call her own hogs, and a good caller she is too. Each caller awaits his turn with his little solo part; then all join and the calls swell into a mighty chorus with perfect timing and rhythm, inspiring to both hog and man.

Farm wives pause in preparing the evening meal and come to the kitchen door; travelers along the highway pull up their horses; small boys, finishing up their own chores, stand quietly to marvel and learn. The housewife knew when she heard the first notes of her husband's call that he would soon be in for the evening meal. She took the pie out of the oven and ladled out the beans. He would perchance be proud of his performance, expecting praise; or perhaps he would be quiet in defeat—someone down the valley had outcalled him, or had introduced a new and challenging fillip to his call.

After the last hog call had died away and the shadow had begun to fall even across the hilltops, the music of the night began. The whippoorwill called from the thicket at the edge of the woods, the crickets and the tree frogs began their monotonous chorus, owls punctured the harmony with their off-key hoots. Man, hog, bird and bug all had a part in this bucolic opera, each taking his turn, joining in a benediction to a day of toil, and blessing a night of peace and rest.

The original purpose of the hog call was to bring the hogs in from the pastures and

the fields to their evening feed. At the first note of the caller, the hogs rouse themselves from the wallows along the creek and the far corners of the pastures and, grunting and complaining, make their way along well-worn paths to the barnyard. At the first note of the call they bestir themselves and start on their way, but the calling must continue until they reach the feedpen. If the caller, short on time or impatient or unhappy about his voice that particular evening, should stop before the hogs arrive at the barn, they are likely to become confused. They find themselves on the way somewhere, going some place, but just where they do not know. Sometimes, because of the similar quality of the calls coming from two different farms, they became confused, but this didn't bother the callers, for the call was the thing, and to hell with the hogs.

The original purpose of calling to bring the hogs in was forgotten in time, and calling became an operatic contest; strictly amateur at first, every caller aspired to become a professional. It was something to be called the best hog caller in the neighborhood. Men were proud of this honor and guarded it zealously, sometimes so zealously that they ruined their calling voices permanently by too much effort, bursting blood vessels and bringing on strokes. It is said that Lon Sparks' father, who in his time was regarded as the best caller in the valley, dropped dead one evening just as he had reached a high and powerful note.

Hog calling was a purely American institution. Our European forefathers had no need to call hogs, for hogs in Europe were raised in pens. When they came to America they turned their hogs loose in the unfenced forests and every evening they called them in for feed and protection. The hogs wandered at will, far away sometimes, and the caller had need to develop a powerful calling voice. Not that the hogs weren't hungry —they always were—but hogs have a poor sense of direction, and short memories.

Every caller was a self-appointed judge of a good call. Time and custom created an unwritten and informal set of rules which guided their judgments. The power of the call was only a minor consideration. Quality was important and so was projection. Some callers naturally projected their voices better than others. The hogs themselves were the best judges of a caller, but they were not consulted. Nevertheless, callers were graded on hog appeal. A hog caller could have a pleasing voice just as an operatic tenor could have a pleasing voice, and it was a joy to listen to him. Fillips and fancy touches that an imaginative caller might add to the standardized call were highly regarded provided they were not ostentatious. Some variations were regarded as in good taste, some as merely affectations.

The standard call, a sort of homeplate from which all calls started and came back to, was a two-syllable word, a long drawn out Whoo-oo-ee-e-e. Two, three, or four whoo-oo-ee-e-e's were followed by three or four short syllables, usually pig-pig-pig-

(*Continued on page* 126)

The caller's personality stamped his call. (below) The appeal from the heart, with bait; (right) the indirect approach, somewhat casual; (below right) the feminine appeal, with cupping; (far right) the call and bang method, designed to bring quick response.

one of the great men of agriculture, Gregor Mendel, 1822-1884

By Grant Cannon

IN THE WORLD OF SCIENCE there has rarely been a more significant paper written. Its reception was one of the ironies of all time.

It was completely ignored.

On February 8, 1865, a cold Wednesday evening, the Brunn Society for the Study of Natural Science heard the first half of the paper, *Experiments in Plant Hybridisation*, read by Gregor Mendel. A month later, Mendel, a thick-set Augustinian monk with a remarkably full forehead, read the second half of the report. In these 41 pages Mendel laid down the basic laws on which the science of genetics firmly rests. He answered the questions which had been puzzling the world's great minds since before Aristotle struggled with the problem 300 years before Christ. And he gave us the tools by which we have created hybrid corn, disease resistant plants, new breeds of livestock, and avoided such undesirable traits as dwarfism—to name but a few of the practical results.

The laws which the modest priest formulated were supported by thousands of meticulous experiments in plant breeding which he had carried on in his cramped section of the monastery garden over a period of eight years. These brilliantly conceived experiments undercut such devoutly held beliefs as the inheritance of acquired characteristics. It also exposed such nonsense as telegony, the belief that a sire will influence not only the offspring he gets, but also the later, unrelated, offspring of the dam; and such sentimental ideas, held mainly by expectant mothers, as that a child will be marked for good or bad by maternal impressions. Mendel dug the grave for these myths and replaced them with the basic laws of inheritance. In doing so he outlined with almost prophetic insight the mechanics by which this was later discovered to be accomplished—the normal and the sexual division of the chromosomes.

As Mendel walked slowly back to the monastery that evening, smoking a cigar, he must have felt disappointed. Not a single question had been asked and it had been obvious not a single member had grasped the significance of the paper. The only comment, the minutes of the meeting show, was an enthusiastic statement about Darwin's *Origin of the Species*—the evolutionary theory which so needed the explanation the members had just heard and ignored.

A year later, the paper was published and sent to the scientific libraries of the world where it lay throughout his entire life like one of the recessive genes Mendel had described—present but unobserved—until other minds with a similar idea germ came across it and brought it back to life.

Mendel, who was never one to reveal his emotions, hid from the world the hurt he must have felt at the complete lack of understanding his paper received. Most difficult to bear must have been the reaction of Carl von Nageli, one of the leading botanists of the day, to whom Mendel wrote two long letters of explanation of the paper and 10 other letters on botanical subjects and to whom he also sent 140 carefully labeled packets of seed so that Nageli could duplicate the experiment.

Two months after receiving Mendel's paper, Nageli wrote, "*It seems to me the experiments with Pisum* (the garden pea) *far from being finished, are only beginning . . . I note with pleasure that . . . you are treading in the footsteps of your famous predecessors* (Koelreuter and Gartner, two botanists long since forgotten). *You should, however, try to excel them and this will only be possible . . . if experiments of an exhaustive character are made upon one single object in every conceivable direction.* (He had in his hands the report on such a series of experiments.) *No such complete series of experiments, providing irrefutable proofs for the most momentous conclusions, has ever yet been made.*"

Though Mendel did not show his feelings of disappointment, neither did he give up his belief in the rightness of his theories. He was a stubborn man. To a friend, Gustav von Niessl, he said, "My time will surely come."

Patient stubbornness was perhaps the most characteristic trait of this priest-scientist. And from the very beginning, his life demanded all the firmness of character and all the downright bullheaded, mulish stubbornness he could muster to carry him through.

Though he was born in 1822, on July 22, Mendel could hardly be said to have been born into the 19th century. His father, Anton Mendel, like the other peasants in the village of Heinzendorf in Silesia, was only partially freed from serfdom. True, Anton Mendel owned a small farm and grew vegetables for the market, but a part of each week he and his draft animals belonged to the Countess Waldburg. Under the feudal law of corvee he was forced to contribute three days of the week of his own work and a day and a half of his horses' time; three days were his to support his family; one day was God's for worship.

Johann Mendel (he took the name Gregor upon becoming a priest) was sent to the village school to study under Thomas Makitta to learn reading and writing and a smattering of natural science. The last subject, which consisted partly of beekeeping and fruit culture, was encouraged by the Countess and by the village priest, Johann Schreiber. The school inspector, however, considered the teaching of such subjects to verge on sin and reported, "Pastor Schreiber is chiefly responsible for the growth of this scandal."

The plan was to remove the boy from school when he was 11 and able to do a day's work. Thomas Makitta, the teacher, recognized a fine intellect in the eager boy, however. He urged the reluctant father to make a greater sacrifice and send the boy on to the upper elementary school in Leipnik. This decision involved more than the difficulty of raising money for tuition and board. It also meant giving up Johann's help with the farm work and the comfort of a son to take over the farm. For what educated man who had gone beyond the elementary grades would return to the farm and the hated corvee?

Young Mendel did so well at Leipnik that a year and a half later he was transferred to the Imperial Royal Gymnasium in Troppau, some 20 miles from home. To ease the financial burden, he was put on half rations and the parents sent him what food they could by messenger. Poorly clothed, cold in the winter, and often hungry, Johann Mendel continued to do excellent work in school. Then, in 1838.

(*Continued on page* 139)

Gregor Mendel, the priest-scientist whose great contribution to genetics was saved from oblivion by the printed word, is pictured (right) on a chalked etching ready for press lock-up.

Cardinal Mercier

Packaged Hay

By Joe Muir, Photographs by Joe Munroe

HAY, ALWAYS A GOOD THING until it comes to the pitching, is about to lose its age-old position as the bulkiest feed in the barnyard. Even the hay bale is destined in the years ahead to be replaced by some bright new hay packaging ideas which will make handling hay as simple as pouring corn flakes from a cereal box.

Many of the current efforts to take the work out of haying are, as one might suspect, coming from California. Farmers in the rich irrigated valleys produce hay as a cash crop. Their hay, sometimes six cuttings a year, goes to the big, thickly populated cow yards of dairymen around the outskirts of Los Angeles and San Francisco, and a lot of it is put onto boats and shipped 2000 miles to Hawaiian dairymen who rely heavily on imported feed.

It is this overseas commerce in hay, as much as anything, that has spurred the search for new haying ideas.

Space is the big problem when you begin to ship hay by boat. Rates are based on both weight and bulk of the goods being shipped; and hay, whatever it weighs, has always taken up a lot more space than some people, especially shippers, think it should.

The answer, they insist, is to find methods to crowd more pounds of hay into a smaller and smaller space.

These little pieces of hay have taken various shapes. One of the most common, and one not at all restricted to California, is the hay pellet which is finding some of its greatest popularity on the west coast.

At Tracy, for example, the San Joaquin Valley Hay Growers' Association has been in the pelleting business since 1955 when they installed two mills at a total outlay of $70,000, and then followed them with a crumbles mill for poultry feed.

At Blythe down in the Palo Verde Valley, where they boast 365 days of sunshine plus fertile soil and good irrigation water supply, Glen Whitlock, president of the farmer-owned Blythe Alfalfa Growers' Association says, "New hay packages promise to put hay hooks, pitchforks and even baling wire out of business." The association, known as BAGA, put in its first pelleting mill in May of 1959. But before the end of the first year they had ordered a second pelleting mill which will help them turn out 25,000 tons in 1960, about double their 1959 production. "We just can't keep up with orders," said Whitlock.

One thing these haying associations like about taking pellets to the hay market is that pellets make it economically feasible to ship hay products greater distances and still turn a profit. Pellets have stretched the marketing area.

BAGA's manager, tall, jovial Oklahoma born Charles Hamman, gets fired with the spirit when he peers into hay marketing's future. "We're installing bins, augering equipment, tank trucks and elevators to handle pelleted hay," he said, "and urging dealers and stockmen to do the same." This will lead eventually, Hamman is convinced, to feedlots and barns throughout that part of the country where hay in pelleted form is moved by belt or auger directly to the cow.

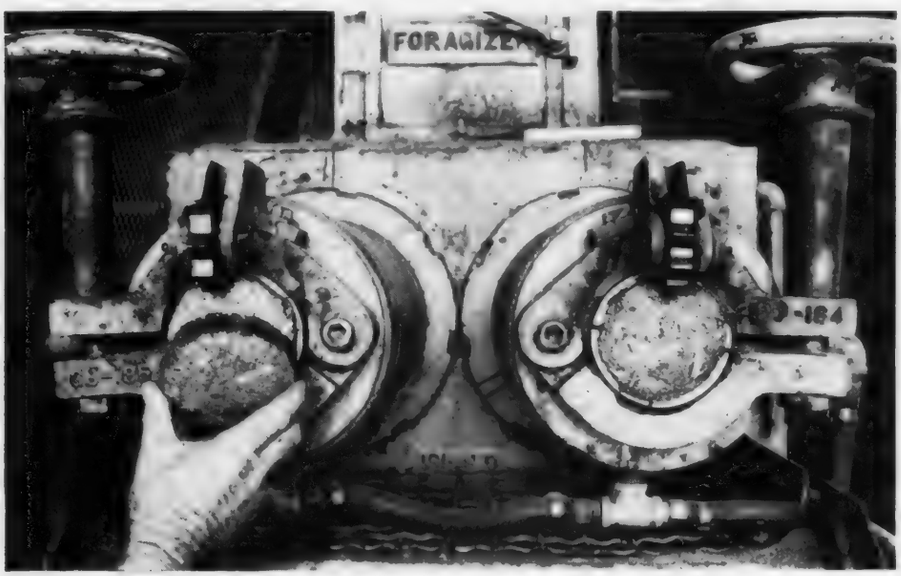
"Here at the plant," Hamman explained, "it costs us $1 and takes 10 minutes to load a 50-ton truck with pellets." How does this compare with the cost of handling baled hay? "With baled hay," Hammann said, "we load a 20-ton truck in two to four hours at a cost of $40." While a truck can haul only one 20-ton baled load to the coast in a day it can haul two loads of 50 tons each of pelleted day, or five times as much.

There's still another saving along the way. The grower can bring alfalfa chopped right out of the windrow straight to the pelleting mill and save the Association another $1.50 a ton for roadside labor.

For pelleted hay which BAGA hauls to the Los Angeles area, where shippers deliver 200 tons of hay a day for feeding some 200,000 cows, the shipping charge is $5.50 a ton. Hauling baled hay the same trip costs $7 a ton. There is, however, a difference in processing costs. The cost of turning out a ton of pelleted hay at the BAGA mills comes to about $10. Baled hay, last December, sold for $40 a ton and pelleted brought $45.

When hay goes through the BAGA pel-

Hay wafers can be handled mechanically in a fraction of the time it takes to move baled or loose hay. Cattle like them even if they must maul the wafer to break it up. They are produced (below) by a machine originally invented to make logs for the fireplace from sawdust.



Packaged Hay

Mechanical handling, shipping space, and the use of hay as a cash crop have all affected the packaging of hay. The compressed bale, half the size of a regular bale, has reduced shipping charges from California to Hawaii from $55 to $21.80 a ton; wafers and pelleted hay can be shipped for $9.50. Fifty tons of pellets can be loaded on a truck in 10 minutes whereas it takes two hours to load 20 tons of baled hay. Pelleting costs around $10 per ton; compressing baled hay into the new small bales runs $6 to $10. Wafering costs $6 from the windrow; $10 starting with baled hay. Complete rations which include grain and protein or urea are now being produced in both pellet and wafer form. Most tests show dairy cattle drop in butterfat production with pellets. Wafers don't cause such a drop. Compressed bales and wafers are now being produced at the plant. The processing may soon move to the farm—perhaps to the field.

Regular baled hay is still the most widely used package for fodder. California dairies use mountains of hay produced as a cash crop.

leting mills it is fortified with 16 pounds of urea and four pounds of minerals and vitamins per ton to bring it up to a guaranteed 17 percent protein content.

Not every stockman in California is convinced that these little hay pellets are the final word. The associations and other producers have a challenge to overcome opinions such as those held by youthful Pete Bekendam of Corona who insists, "We like to buy baled hay direct from the farmer." The Bekendams, who buy 2000 tons of hay a year to feed their 270 head of cows, figure they buy cheaper than they would from the Association, have a wider selection on quality, and can choose their growers. And, finally, they say, "We just don't think pellets can do the job like baled hay."

Down the road a few miles, at River Farms, foreman Howard Gable is quick to give you the other side of the story. "We like pellets," he says, "because they save labor and time and are easy to store." Gable who has fed pellets for two years, offers them to cows in large self-feeder bunks. He is even using pellets as roughage for young stock, dry cows and a pen of beef animals.

Gable has a feeding test underway to determine the relative merits of baled and pelleted hay for his animals. One group is getting grain and pelleted hay while the other group is getting grain and baled hay. "We want to test the effect on butterfat," says Gable. "We've already learned," he adds, "that cows on pellets show less variation in butterfat production than those on baled hay do when we change their silage or grain ration."

The price of pellets, in Gable's opinion, is still too high but he expects, as does Charles Hamman of BAGA, that competition will level out somewhat the price difference between pelleted and baled hay. One thing he especially likes about pellets is that they get rid of baling wire cluttering up the place. "That in itself is a blessing."

"Pelleting," says Hamman, "definitely cuts feed wastage and, according to the dairymen, cuts down digestive disturbances." He also thinks pelleting increases palatability, feed intake and daily gains.

Dr. James H. Myers, animal nutritionist at the University of California at Davis, said, "There's no doubt there is a feed advantage in pellets. I think it's just a matter of years until all hay is fed in pellet or wafer form, and not many years either." And tests on the Ramon Somavia ranch at Hollister, California, which were run by the Stanford Research Institute, showed that feed costs per pound of gain run 10 to 12 percent less with pelleted feed. The improved feed efficiency was so convincing, Somavia installed a pellet mill.

Field pelleting is almost certain to gain an important place in hay packaging eventually. A few of the farmers selling hay to the Koster Hay Company at Chino, California, have already tried pellets, and feed dealers predict the day is coming shortly when they can buy hay already pelleted, directly from farmers.

Pelleting, in California as elsewhere, is bringing great changes to hay processing. But there are other new developments that may hold still greater promise.

One of these is a junior-sized hay bale designed to cut shipping space at least in half. A couple of years ago, W. E. Straight, manager of the San Joaquin Valley Hay

Growers' Association at Tracy, California, decided that hay bales were taking up entirely too much space in trucks, barns and especially the holds of ships hauling it from California to Hawaii. Straight had in mind a big heavy duty machine that might cut down the space required for hay bales. The only trouble was that no one had yet made such a machine.

At Manteca, California, Mr. Straight searched out two master mechanics, George Joy and Everett Rankin, and outlined what he needed. Here was a challenge. Straight wanted them to build a machine that would compress regular baled hay (which has a volume of 180 cubic feet per ton), enough to make a ton fit into 80 cubic feet. Such bales, if they could be turned out, would reduce shipping charges on baled hay from California to Hawaii from the $55 per ton figure for regular bales to $21.80 per ton.

Joy and Rankin worked out the details for one of the strangest looking machines they've ever turned out. They had to figure out ways to move regular bales into the machine for rebaling; what size motor they needed; and the pressure requirements for the piston.

When they rolled the machine out in time for packaging the 1959 hay crop it was a heavily constructed device about 20 feet long, eight feet high and seven feet wide. On one end was a baler. Mounted opposite it on the other end of the machine was a 150 hp motor. The motor builds up compression enough to shove a steel piston six inches in diameter and eight feet long against the hay bales with a hundred tons of pressure.

Regular bales are cut in half and compressed to half their original volume. The cost of rebaling runs from $6 to $10 a ton. The Hawaiian stockmen, according to Straight who has been over on the islands to talk with them, are, "Wild about these compressed bales." They're easier to handle, says Straight, the cattle eat more and there is less flaking out.

Straight and his Association are so firmly convinced of the future promise of the little, tightly packed bale that they're thinking now about a machine that will pick up hay from the windrow and push it into these miniature compact bales with no need for rebaling.

Wafers

But perhaps the packaging idea that has California hay people most excited is a plan for putting hay into saucer-sized disks that make alfalfa look like a refugee from a breakfast food factory.

Here is an idea that has been kicked around the hay fields and engineer shops for years by people who saw the need for putting hay into more easily handled packages. International Harvester and Ford have experimental field models.

The San Joaquin Valley Association installed its first wafering machine in the spring of 1959. Here is a machine not designed for the average farm. The installed cost to the Association came to $65,000. They'll get it back, they figure, in savings on shipping costs because freight costs to Hawaii for hay wafers are only $9.50 a ton in lots of more than 2000 tons, the same as the rate for pellets.

Last June, when the big machine embarked on its maiden voyage the Association collected 174 tons of alfalfa wafers from it. And, by the end of 1959, they had shipped 2500 tons of the wafers to the Hawaiian market, as well as making trial shipments to Panama and some South American countries.

But lower shipping rates are not the only advantages listed for wafers, which incidentally, the people at Albers Milling Company and Sumner Iron Works who worked out the machine insist on calling "Hayfers." There have been some economic studies done on feeding wafers, including research at Oregon State College. These studies show cattle eat wafers just as readily as they eat baled hay although some feeders observe that the wafers are so tightly compacted that cattle have to maul them about considerably to break them into bite size.

At Oregon State they test-fed wafered hay, baled hay and finely ground alfalfa pellets to learn what happened to milk production. For all three rations milk production was the same. There was, however, a butterfat reduction from feeding finely ground pellets as compared with baled hay or wafers. But the big promise wafers hold for dairymen and beef feeders, as well as hay growers who sell to the cash market, is the possibility they offer for total mechanization of hay handling from field to animal. In California this hay packing plan has eliminated five handling chores. Cooperating members need no longer pick up baled hay from the field, stack it by the roadside, load it on trucks, unload it from the trucks and finally the feeder doesn't need to break the bales open for feeding. What's more, wafers have three times the density of baled hay—a big saving in space.

The machine that extrudes these cow biscuits weighs about 7½ tons and you have your choice of a stationary or field model. The stationary model is mounted on concrete. The field model is parked in a corner of the hay field and hay (chopped in lengths of three inches or less) is hauled directly to it. The hay is fed into the machine and, depending on the ration you want to feed, you can run grains and supplements in at the same time

From the other end the hay comes out continuously in two four-inch extruded cylinders at the rate of six tons an hour.

The wafering machine does heavy work. Chopped hay, tumbling into a hopper on top of the machine is first pressed by a clamp. Two pistons, working at 180 strokes a minute, push it from the clamp into a taper sleeve cylinder. Here, depending on whether you want a high or low density wafer, the machine really puts the pressure on and the hay comes out of the cylinders to

The compressed bale is cut in two after baling. Compression reduces it to half its former volume and requires a 13 gage wire tied with a clinch-head tie. The bale flakes out cleanly when opened. Work is underway on a baler which will produce a compressed bale from the windrow.

Bagged alfalfa meal commands a steady 10 percent of the total alfalfa market for inclusion in mixed feeds. After grinding, the meal is mixed with molasses. Most of it goes into poultry feeds.

Pelleting can be a dusty, steamy job (left) and occasionally the machine spits back. The pellets can incorporate a complete ration. Feed costs per pound of gain run 10 to 12 percent less.

fall off in disks, a half inch to an inch thick ready for feeding. Costs of wafering run $6 per ton for hay from the windrow; $10 for baled hay.

Next on their list of hay packaging ideas up for trial by the San Joaquin Valley Association is to make a complete feed into wafers. Some producers have such feeds on the market now and you can buy both roughage and supplement in a single wafer that is delivered, tagged with the content of protein, crude fat, crude fiber and ash. Hay has come a long way.

Marketing Associations

One thing that has added speed to the growth of these new hay handling ideas is the success of hay growers associations through southern California. The associations grow from a need. Back when baled hay was the newest thing on the market, the hay business in that region was a free-swinging enterprise, with every one at the mercy of everyone else.

The charter members of the San Joaquin Valley Association can recall conditions 20 years ago that first brought them together for a try at group action. Prices were low and unstable. The growers had two years' hay crops on hand and a batch of bum checks from buyers.

One of those charter members was Otto F. Muller of Roberts Island. "We had been gypped long enough," he says. "We were used as pawns by unscrupulous hay dealers, who pitted one farmer against the other until they got them fighting among themselves and under-bidding each other. No one knew what the market was and we had no way of protecting ourselves against bad checks. We needed an orderly market and we needed to expand our sales so we could be sure of moving the crop every year."

When they organized their new San Joaquin Valley Hay Growers' Association that year there were already other such associations in surrounding regions. And everywhere they had organized for about the same reasons.

The San Joaquin Valley Association started with 30 members whose hay acreages totaled 2680 acres. They've grown now to 300 members and a staff of 21 employees.

From their original office at Stockton, Straight and Assistant Manager S. K. Neal, who have guided the Association from its birth, began to put some order into the demoralized hay picture. They worked to get new areas included in the state and federal market reports and to put the hay market on a grade basis. They set up an Association legal department, helped get state laws requiring licensing and bondings of dealers, and started their own credit and character rating file on dealers. "It was like weeding the garden," says Neal.

Perhaps they never will be able to rule out completely the possibility of tricks such as that used on one grower some months back. The grower was eating supper when a truck driver came to the door to ask him where the hay was he was to load. The grower, assuming it was an Association truck, pointed out the hay and went back to his meal.

After dinner he went out and lent a hand helping load the truck and then stood in the yard waving *bon voyage* to his load of baled alfalfa, which, according to Association custom, would bring him a check on the 10th of the following month. But no check came and the Association reported, when he called them, that they hadn't sent a truck to his farm in the last month. "Losing the hay," said the grower, "was bad enough, but I sure felt bad about helping the crook load it."

Farmers in this valley produce five or six cuttings of hay a year from each field and, over a 20 year period, have averaged 6.46 tons of hay per acre. Their cost of production comes to about $20 a ton and their income is about $60 an acre before taking out for their own labor.

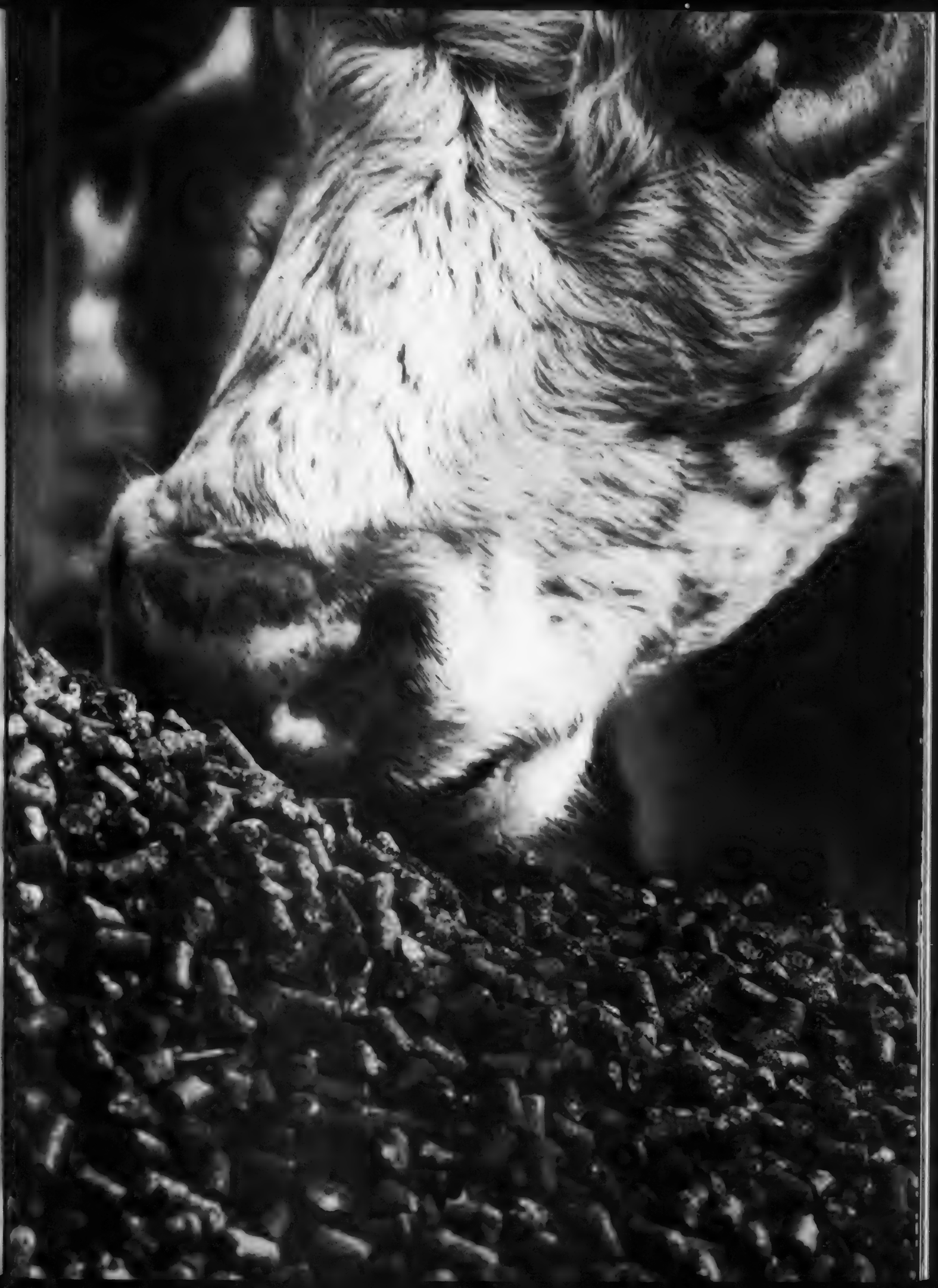
Last year the Association marketed 165,000 tons of alfalfa for its members and bought another 35,000 tons from nonmembers. The grower gets paid on a 30 day cash basis. The Association takes out a 12 percent commission which is broken down into three funds. One is a seven percent revolving fund, the unused portion of which is returned to growers at the end of the year. Another four percent goes into a five-year revolving fund and one percent is held for contingencies. Last year the Association's revolving funds paid back to growers some $140,000.

Other grower associations in this cash hay area have similar histories and similar methods of operation. Beside the co-ops there are many independent dealers scattered over the region. The constant demand for hay in the concentrated dairy areas keeps fleets of truckers on the highways.

The hay market is such an integral part of the economy that you see evidence of it wherever you go. On a well-traveled road a few miles east of Chino, for example, is a bartender who has a second job, perhaps even more important than dispensing drinks and sandwiches. Behind his place of business is a set of truck scales put there for the convenience of hay truckers. The beam is inside the building, conveniently located behind the bar and no matter when you pull in with a load of hay the bartender can pause in his beer dispensing long enough to check out your load weight on approved and inspected scales.

But the day may be close at hand when hay truckers will cross his scales less and less frequently. With the associations and the feeders and the farmers looking for new handy hay packing ideas and finding them, the future may hold just what Charles Hamman of BAGA predicts. "Hay bales," he says, glancing at his hard-working pelleting machines, "are going out of style."

The end



By Chester Charles

Low Cost, Low Loss Farrowing

Tired of losing pigs, this Maryland farmer centralized farrowing, reduced crushing to near zero, and put his hog business on solid footing.

DORSEY HINES, Del-Mar-Va Peninsula farmer at Chestertown, Maryland, has built a fully equipped 30-sow farrowing house for less than $4,000. The cost includes a battery of farrowing crates of his own invention. With the farrowing crates, he is saving 2.4 extra pigs per litter.

His 277 level, fertile, Maryland acres front on the Chester River, which opens on Chesapeake Bay, a few miles distant. Dairying and broiler production are typical of the peninsula. Dorsey Hines is not the first of his family to favor general farming with emphasis on a specialty. When his grandfather farmed the place, peaches were the specialty. At the river landing, a flag was raised when the fruit was ready for pickup by the packet boats out of Baltimore. Now the product, meat on the hoof, is trucked across the four-and-a-half mile bay bridge. Hogs are the main enterprise, made more profitable by the Hines flair for invention.

Half a dozen years back, Hines looked to hog expansion as his best hope for greater volume. His 30-cow beef herd and his 100-ewe sheep flock were at maximum levels for the available pasture. Acreage expansion was uneconomical. Help became scarce and expensive. "In the early 1930's," Hines recalls, "my wife Elizabeth fed six hired hands every day in the big kitchen. Then, we raised 25 or 30 acres of tomatoes and thousands of turkeys. We couldn't do that now at current wages. In recent years our labor force has consisted of a tenant plus a full time day worker and myself. I decided that increased hog production would be possible and profitable, but I wanted to cut costs to the bone. Pig losses in our old individual houses had always been distressing. Our first big step was to build an inexpensive central farrowing house. Our goal was 2,000 hogs a year, which is more than we can raise feed for, except in an unusually good corn year. Other years, we can either buy feed or sell the excess pigs."

Hines prefers twice-a-year farrowing, in January-February and again in June-July. In the individual hog houses, winter farrowings on the peninsula were rough on the farmer, the sows and the pigs alike. "Checking the 60 individual houses we had then by flashlight on a blustery January night with the wind and the sleet off the bay was a bitter chore," Hines said. "Surprising a sow at midnight was taking your life in your hands. If a sow needed help, it was almost impossible to work with her in the low-ceilinged, crowded quarters. In many litters there would be a sickening number of crushed pigs. Every morning we'd pick up a bucket full of dead pigs. We'd have to pull them out of the houses with rakes or with a sort of snare on a pole I rigged up, to keep from having an arm bitten off by an angry sow. We tried everything the colleges suggested, heat lamps suspended in the center to attract the sow away from the corners where pigs would be more likely to be crushed, very little straw so pigs would not be lost in the bedding, guard rails all around, and any other protective device suggested or read about. We had big litters. But not live litters. Despite all precautions. 6.8 live pigs per litter was tops as a year average for us."

Before going ahead with a central farrowing house, Hines tried indoor farrowing on a small scale. He set up a unit of six conventional farrowing crates in one wing of a sheep barn. In the crates, once farrowing was over, losses of pigs by crushing were few. "I regret I didn't keep separate records of the pig losses in the regular farrowing crates compared to my methods before and since. It was obvious to me, however, that the big losses were from crushing which took place during farrowing. To hold down these losses we took turns at the night watch, but we still lost too many pigs. When I lost an entire litter of 10 from a blue ribbon gilt during a short dawn absence, I was desperate. I scrapped my entire program and started over."

A New Beginning

In sanitation and general management, in breeding and nutrition, Hines felt he had been doing a creditable job. Diseases were no serious problem. He had no difficulty in marketing hogs locally at 200 pounds in 5½ months at $1.00 to $1.25 over the Chicago quotations. He said, "I decided that scientific nutrition along with wonder drugs as feed additives and conversion efficiency are meaningless to a dead pig. In my estimation, farrowing was our weak spot. After I started regular farrowing crates, I lost very few pigs after they started to nurse. Most pigs, I believe, are crushed during the farrowing period. I came to the conclusion that, for me, profit or loss in hogs is determined largely by the number of pigs that survive the farrowing process."

Hines hasn't as yet reached his goal of 2,000 hogs annually, but he may pass it before the year is out. This spring his 120 sows averaged 9.2 live pigs (up 2.4 pigs per litter), for a total of 1104. The same number of sows have been bred for fall.

A total of 30 litters can be handled at any one time in the new farrowing house, built two seasons ago. In it, breeding crates stand 3 feet apart, 15 to a row, with an aisle between the two rows. All sows face the center aisle for easy feeding, and for quick manure removal by garden hoe and fork through the hinged windows. Allowing up to two weeks for each sow in the crates, with litters of about eight pigs each, a total of almost 6,000 pigs could be farrowed in the house in one year using a system of multiple farrowing.

The building, 82 feet long, 24 feet wide and 10 feet to the eaves, has no frills. Of pole construction, the framing is of local green oak, the large windows of tough but low cost plastic. In the summer, simple frames of wood covered with burlap are hinged at a slant before the windows to shade out the sun. The window frames can be removed for greater air circulation. No other cooling is provided in summer, and no heat other than heat lamps is supplied the sows in winter, although Maryland has extremes of weather. The floor is packed dirt. Three 12-foot wide sliding doors allow for easy cleaning. The wiring, the water piping to the two frost-proof hydrants along with the entire building construction was done by Hines and his tenant. The purchase of a $56 electric saw speeded and

House

simplified the construction.

Here is a breakdown of Hines' building costs, to which the costs of wiring and water piping should be added:

Pole Barn
82 feet by 24 feet

Green Oak framing at 9½ cents a board foot	$ 295.81
Pressure treated posts	80.74
Tongue and groove siding, window frames and miscellaneous hardware	257.00
Plastic sheets for windows	13.58
Corrugated aluminum roofing	488.75
Pressure treated 2″x 12″ planks outside for protection against cattle in adjacent lots	98.42
	$1,234.30

"The building and the equipment are both inexpensive. They don't look pretty but they save pigs," Hines said. "I am not one to suggest five, or six, or even eight pigs as a break-even point. I believe the break-even point varies. But, regardless, the extra pigs you save are the real margin of profit in any hog operation."

Inside the building, the farrowing equip-

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A split second old, the newborn pig (right) slides into the box behind the Hines farrowing crate. Pig boxes and heat lamps await each farrowing (below) with the floors of the crates raised about a foot. When farrowing is completed, the sow is lowered and the pigs are allowed to nurse as in a conventional farrowing crate. A total of 6,000 pigs could be farrowed in the house (below right) which was built by Hines and one helper. The building is of pole construction.

By R. J. McGinnis

CORN HOBBYIST

NORMAN KEYSOR lives on a 247-acre farm on a side road just out of Lakeview, Ohio. Mr. Keysor is known far and wide as "Keysor, the Korn Krank." The word "Krank" is used in its best sense, and Mr. Keysor has no objections to the epithet. "I am a crank about corn," he said. "It's because I love corn and I think it's the most beautiful thing in the whole world. Some of my neighbors think the most beautiful thing in the world is to see a pen of fat hogs eating corn. To me the thing of beauty is the corn, not the hogs."

When I called on Mr. Keysor to talk corn his pretty, grey-haired wife, Cretoria, met me at the door. I told her my mission and asked where I could find Mr. Keysor. "He's out with his corn. Where else?" she said. I found Mr. Keysor squatting on the barn floor husking corn. Just as I stepped in the door he had found a particularly fascinating ear. "Look at this," he said, "isn't that beautiful?" I went over and squatted beside him and watched him go through the pile of corn. He worked feverishly and as he stripped the husk from each ear his eyes popped and he made strange chuckling noises in his throat. He stroked an ear lovingly and held it up for me to admire. He seemed to be a man who hadn't eaten for a long time and was trying to make up for days and years of hunger. Mr. Keysor's hunger for the next ear, for what lay beneath the husks, was contagious. I found myself pulling out the ears and exclaiming to him as he had to me, "Isn't this beautiful?" "Look at this one!"

No two ears were alike. Colors ranged from the familiar yellow and white to a deep blue, almost black, crimson, striped, purple—all colors of the rainbow—on individual ears and all mixed on the same ear. Size ranged from an ear of Tom Thumb popcorn, no bigger than a baby's pinkie, to a 14-inch ear of Longfellow.

Mr. Keysor is a kindly and courteous man, and it finally dawned on him that he ought to exercise his duty as a host. He sat back on his heels and told me how he got the reputation of being the crankiest corn collector in Logan County, "and perhaps," he added, "in the whole United States."

Mr. Keysor was born on a farm in Auglaize County, taught school for a spell, and then bought the 247 acres on R.R. No. 2 out of Lakeview in 1947. "There's nothing but good dirt on this farm," he said, "and I raise big crops and feed out a bunch of Angus. That's my bread and butter. The joy of my life, my recreation, and you might call it my profession, is growing all kinds of corn.

"I have always grown, when I could, some of the more decorative types of Indian corn just for the fun of it. I always wanted to have more time and know-how to go into the infinite varieties of corn. About 4 years ago I walked into a florist shop and saw an ear of pod corn hanging above the florist's desk. He gave it to me and I planted a few hills from the ear that year, and that started me off. I have set aside about four acres of my best land and last summer I had 21 different strains and varieties on the four acres. These are not all the varieties in existence, and I add one or two each year as I can get them. Right now I am trying to find some Teosinte and Tripsacum seeds. Teosinte and Tripsacum were the primitive plants from which corn was developed somewhere down in South America. The next step in the evolution of corn, which was pod corn, is quite common."

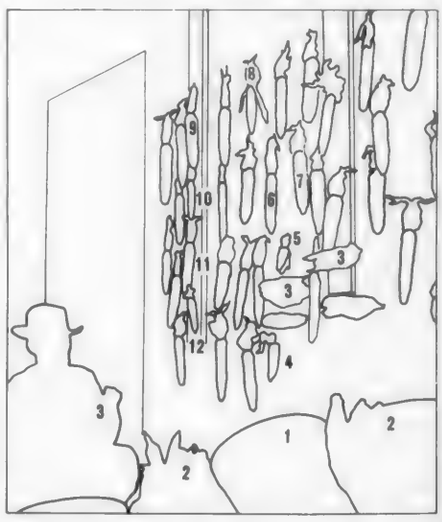
Mr. Keysor pawed around among the piles of corn on the barn floor and finally came up with an ear of pod corn. "As you can see," he said, "each grain is enclosed in a small pod in rows on the cob. On this ear the husk on the grains and the husk on the entire ear are purple, but it also comes in other colors and in white. Some pod corn is still grown in Kentucky for cattle feed, and it's quite common in Mexico and in South America."

Mr. Keysor is a practical scientist and, while he is well versed in the botanical angles of corn, he has his own working classifications which he says are more practical for the corn hobbyist than the botanical classifications.

"No two botanists agree," he said, "on the number of varieties. Some professors say there are as many as 21 varieties, but to my mind some of them are merely variations of the same strain. I know that I can get three or four variations out of the same seed. In my system—you might call it the Keysor system—there are six types: sweet corn, popcorn, flint corn, dent corn, pod corn, and soft or flour corn. Right here on this place last year I grew three varieties of sweet corn: Golden Bantam, Stowell's Evergreen, and the old-fashioned Country Gentleman. On the Country Gentleman the grains are not arranged in rows. They are zig-zag. Sometimes this corn is called Shoe Peg Corn.

"I have seven varieties of popcorn, White and Yellow Hull-less (here the schoolteacher in Mr. Keysor showed through—'Did you ever hear of a word with three L's in a row?' he asked), South American Yellow, which is sometimes called Dynamite, Strawberry, Bear's Paw, and Carnival." As he named them off, Mr. Keysor hustled about and found an ear of each to illustrate his list. "This is the cutest corn I grow," he said, holding up an

(*Continued on page* 104)



Norman Keysor sits on the steps of his corn headquarters (right), a reassembled log cabin from his old home place. The display, on the wall and in the baskets, lacks a few of the varieties which he grows. The key above identifies the following varieties: 1 Pod; 2 Ornamental; 3 five ears of Pod (in hands); 4 Ornamental, with purple husk; 5 Strawberry pop; 6 Longfellow, a yellow flint; 7 Hickory King dent, a southern White Hominy; 8 Dynamite, South American type pop; 9 Yellow dent, open pollinated; 10 Golden Bantam sweet; 11 Blue Clarage flint; 12 Carnival, vari-colored pop; 13 "Kissin' Corn," red dent; the two ears below the middle basket in the top row are Navajo Flour Corn. Ears not identified are ornamental mixed varieties, dents, flints and flours.

By George Laycock

FERTILIZER PLACEMENT
no waste, no burn

FERTILIZER, LIKE FIRE, is good until you get too much of it in one place. Then, instead of increasing yields (and profits) it can actually cut the crop back. One recent autumn John Miller discovered this on his northern Indiana grain and livestock farm. Miller's dilemma was one that plagues thousands of farmers.

Wheat allotments had cut into his farming plan. Oats were a poor substitute because they hardly paid for themselves. The only answer Miller could see was to bear down hard on the wheat fertilizer. He knew experiment after experiment proved wheat responds well to fertilizer and that he could increase yields by increasing the plant food.

But if you double your fertilizer application on wheat as Miller did, then get outguessed by the weather, as Miller did, you reap more than your share of troubles. It was a dry fall and the wheat came up late and spotty. When it was up, Miller figured he had a three-quarters crop at best. His well-devised plan had gone astray and the fact that he had neighbors in the same predicament wasn't much comfort. Here was a situation where better weather, wiser fertilizer placement or both would have spelled higher yields.

Such losses are heavy over the wheat country in any dry fall. With fertilizer rates of application increasing and formulations becoming steadily more potent, this whole problem of fertilizer placement is becoming increasingly critical.

Take a quick look at what has happened to fertilizing rates in recent times. Just 10 years ago the most popular fertilizer formula through the Midwest was 2-12-6. This season one of the most popular will be a 5-20-20 mixture. What's more, we are putting it down in constantly increasing quantities.

But it's not the fertilizer itself that should get the blame. We are putting a lot of this more concentrated fertilizer down in the wrong places. Much of it is placed too close to the seed.

Liquid fertilizer placement (left) should follow the same rules as those for dry or pelleted material. The liquid will move vertically in the soil far more than it will spread from side to side.

FERTILIZER PLACEMENT
no waste, no burn

Fertilizer placement involves putting down the plant food where it is needed most without burning the seedling. Nitrogen and potash are usually thought the most dangerous, but phosphorus has been found to burn the young plant, too. Placement prevents burn and increases the value of the fertilizer to the crop. Corn is best fertilized in a single band an inch below and two inches to the side of the seed. Small grains are less susceptible to the fertilizer burn. They respond best to band placement an inch or two from the seed. Some farmers are using two drills pulled tandem —one with seed, the other with fertilizer.

On the other hand, fertilizer applied too far from the plant is out of reach of the roots, as surely as if it were left in the bag.

Researchers are gradually solving the fertilizer placement problems. Many of the answers are already known. In fact, enough is known to show us how to avoid most damage from fertilizer and still reap the bigger yields it offers. It's a matter of making use of the knowledge in many cases; in others it's a matter of developing better planting machinery.

One of the busiest spots for research in fertilizer placement is the campus of Michigan State University. The soils Department there, headed by tall, dignified Dr. Ray Cook, a longtime leader in soils research, has wrestled with the fertilizer placement problem since 1934.

By way of pointing out what such soils research can actually contribute to farm income, Dr. Cook mentions the change that has come to sugar beet farming. "Before 1934," he says, "we thought 200 pounds of 3-18-9 was the safe maximum to use on sugar beets. The average yield was 8 tons per acre. Today we put on 500 to 600 pounds per acre of 5-20-20, about five times as much nitrogen, three times the potassium, and five times the phosphate, and this combined with better seed and cultural practices, will give us an average yield in Michigan this year that we're predicting at 15 tons per acre."

A good fraction of the current research in fertilizer placement is centered around small grain production. "We had noticed for years," says Michigan State's Dr. L. S. Robertson, " that unfertilized wheat came up faster and better than wheat on the plots we fertilized. Standard wheat fertilization when we started was 200 pounds of 2-12-6 or 2-12-12. We began exploring possibilities with different rates of application."

Dr. Cook asked one day in the early 1940's what would happen if they really loaded wheat down with fertilizer—say 500 pounds per acre instead of 150 to 200.

During the next few years they began increasing the rates of application in check plots until they were fertilizing some wheat with as much as 1200 pounds of 4-16-8. They were thinking only of how much yields could be increased.

"We found out," says Dr. Robertson, "that the heavier we fertilized, the longer it took the wheat to germinate. But 500 pounds produced excellent results."

Next the Michigan Extension Service picked up the findings. They tacked up posters all over the state informing farmers that they should fertilize their wheat at the previously unheard of rate of 500 pounds per acre.

Paul Rood, the Extension man responsible for spreading the message, now thoroughly sold on the heavier fertilization, planted his own wheat with 500 pounds of fertilizer per acre. And Dr. Cook, logically enough, applied the same rate on his wheat allotment acres on a farm he owns.

Everything was rosy. Yields increased and every one concerned—farmers, researchers, and fertilizer salesmen—were happy.

Then came the dry falls of 1953-'54 and '55. Michigan farmers normally plant their wheat at the driest part of the year anyhow, from mid-September to mid-October. Now, with the drought on them, Dr. Cook, the Extension personnel and other farmers across the state found that the heavier fertilization produced only half a stand of wheat. Fields lightly fertilized according to the old standards, however, came along fine.

The answer here was not to say that forever and all time, wheat in Michigan should get no more than 200 pounds of fertilizer to the acre. Dr. Cook and his research staff knew the problem was in fertilizer placement. Old standard grain drills dropped seed and fertilizer down the same drop tubes and left them lying in the soil right against each other. As soon as the nutrients went into solutions of salts, the seed was bathed in the solution. From research with other crops, such as sugar beets, beans, and peas, they knew the fertilizer and seed should be separated.

After the dry season failures, Dr. Robertson began wondering how to get a drill that would separate seed and fertilizer. He tried seeding wheat through every second drop and fertilizing through the others, thus planting wheat in 14 inch rows instead of seven. Even with high rates of fertilization this permitted good germination. But this research needed precision equipment that would plant test crops to within fractions of an inch of where researchers wanted them and fertilize them with accuracy right down to the last pound.

This was when the USDA came into the picture. Technicians at Beltsville, interested in the same problems, designed and built a grain drill that was wonderful to behold but perhaps a little frightening to the average tractor driver. Drop tubes could be adjusted both vertically and horizontally through a wide range. Separate drop tubes for fertilizer could also be widely adjusted. These adjustments could be accurately measured. And, of course, the fertilizer attachments, which fed off the top to avoid clogging and misses, metered the plant food out to accuracies of less than a pound per acre. There are several of these precision research seeders scattered around the country today.

"This was," according to Robertson, "not the fastest grain drill in the world to seed with. It took five of us and the machine a day and a half to seed a half acre." But nobody cared. They knew the test plots were planted accurately and the results would give them some ideas on the best ways to use varying amounts of fertilizer for maximum benefits and least plant damage. That was what they wanted.

Meanwhile, Dr. J. R. Guttay, then with

(*Continued on page* 118)

Lazy Susan Feedlot

This feedlot has both automation and diversification; it takes 45 minutes labor to feed 300 cattle.

"If you're still feeding beef the way you did 10 years ago, you either have to find a way to handle more cattle with less labor or get out," Harry Matthews, a professional farm manager, said the other day. And feeders who keep good records are not arguing the point. They're spending their efforts instead, in the search for new and better ways to apply Henry Ford's production principles to the hamburger.

It's a search that recently led Matthews, a highly experienced beef feeder, who manages farms for Opekasit at Hamilton, Ohio, to design and erect one of the most advanced automated beef feeding factories in his section of the country. It has enabled the 2174-acre Trelawny Farm, which the Matthews family owns in Green County, Ohio, to jump an annual production of 250 head of finished cattle to 900 head, while reducing total labor requirements.

"We considered several methods of building up the feeding operation," Matthews said. "On rougher land, where the terrain provided some natural protection, we might have built less expensive buildings or even done without buildings.

"Some feeders have converted existing buildings into mechanized beef feeding units. This is sound practice where the completed project does the job and the conversion saves money over what a completely new system would cost. But we had no barns suitable for conversion.

"Some feeders are able to haul feed to cattle with self-unloading wagons," Matthews continued, "but this seems to be better adapted to considerably bigger feeding operations than ours, so this idea, too, was abandoned. The one logical solution left was to build the completed system with feed storage, automatic feeding equipment and housing for the cattle."

This new system helped solve a whole group of related problems plaguing the manager of Trelawny Farms.

For years cattle had been fed at Trelawny much as they were fed on surrounding farms. But when Harry Matthews took over management of the farm a couple of years ago, he was less than satisfied with results in the beef feeding enterprise. He realized that sending cattle to market no more than twice a year, as they had done, left them at the mercy of the market.

"Have some cattle ready for market every week or two," Matthews said, "then you can take advantage of short term market conditions. You can often feed through the short price declines." With his plan for frequent marketing he was convinced he could eliminate some of the gamble from beef feeding because his prices over the year would average out.

He also wanted to create a feeding program that would make year-round use of buildings and equipment and get maximum return from the investment. Here was the same thinking that had, in recent years, led hogmen into multiple farrowing.

A building plan that would enable a feeder to accomplish these objectives had to be designed around several needs. "It is almost essential," Matthews pointed out, "to have several feedlots if you are going to have cattle ready for selling several times a year." The different lots would enable him to group cattle into more uniform sizes and conditions.

And, whatever the eventual mechanical set-up, it should enable the feeder to serve different rations to the various pens when necessary. Ingredients of the ration, as well as amounts fed, should be factors over which the feeder has critical control. This meant that equipment for weighing feeds was essential to the plan.

Automation is often the enemy of diversification in agriculture. With his plan for several feed lots, Matthews could have automation with provisions for diversification. There would be no reason for uniform cattle and uniform feeding.

Matthews also wanted a feeding layout that could grow if Trelawny Farm needed to feed more than 900 head a year at some future time. "It might be," he said, "that even the farmer who feeds 900 head a year will be out of the picture in a few years."

From the time planning first began, a major consideration was the labor required to handle the 900 head per year total with 300 head being fed at any one time. Concrete slab floors would simplify manure handling and mechanized feeding. The 300 head of cattle, if the Matthews plan worked out the way his figuring indicated, would take one man 45 minutes twice a day. And this would allow him time to see every animal every day.

The installation was designed to handle only the finishing period when the cattle are on full feed. Old buildings could be used for wintering calves to use available roughages and fill in the slack time with labor. Some pasture land could also be used by these animals in spring and summer. Under this program, Matthews hoped to buy 400 to 500 pound calves exclusively.

One other element entered the planning as something of a last resort. Should beef cattle feeding become a long range losing proposition, the feeding equipment would not stand idle. "Most of the facilities," he said, "could quite easily be adapted for a hog feeding floor."

The final plan looked good. It met all the demands, and the Opekasit agricultural engineers began the designing. Here was progressive, advanced thinking applied to an agricultural trouble spot.

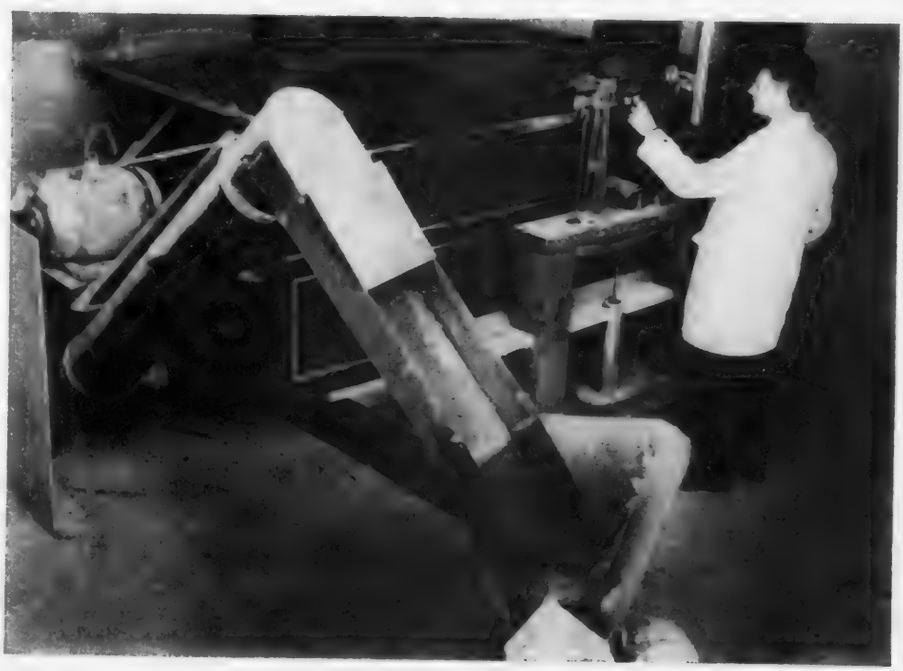
The Barns That Jack Built

One test it did not meet, however, was inexpensive construction. This level corn country offered no shelter or even woods to protect animals from the weather. The unit had to be built out in the middle of a field on high value land. The more compact it could be kept the less good corn land would be taken out of crop production.

In spite of the fact that, as Matthews said, "The deeper I got into this thing the more it scared me," you can see the feeding unit there today in full operation, running smoothly just as the paper work promised.

The feeding pens, shaped like wedges of a pie, are grouped in a semi-circle around the feed storage and preparation center. Except for the silos you would hardly notice the group of low buildings back in the field against the skyline. The four large silos hold corn silage and shelled corn. Be-

An aerial view (top) shows the semicircular layout which permits a pivoted auger from the feed center to serve three augered bunks. Harry Matthews, who designed the lot, sets the scales (right) which weigh the feed in the self-unloading wagon body; then he presses the switch (far right) which fills the wagon body with silage and supplement.



side them is a nine-ton supplement bin.

Each of the three pole barns measures 60 by 60 feet. You'll find varying opinions about whether or not this is sufficient space for the 100 head of cattle. Matthews feels it is. There is enough space under roof for all the cattle to bed down.

The barns, custom built by Opekasit ag engineers, are framed with fir and the aluminum roofing helps keep them cool in summer. Inside each barn at the front and center is a 30 by 30-foot straw storage area.

A 53-foot feed bunk extends from the front of the barn the length of the feedlot and on either side of the bunk is a wedge-shaped concrete slab. The concrete feeding floors slope at the rate of a half-inch per foot toward the back of the lot for drainage. The feedbunk divides the lot into halves of 1600 square feet each, and a fence separates the two lots of cattle inside the barn.

Like kittens grouped around a milk saucer, all three of these barns and lots face the feed center. Each of the three feedbunks is 54 inches wide and protected by a 10-foot aluminum roof. The bunks, built of concrete blocks and a slab floor, are supplied by 50-foot augers that carry feed from the feed center to the cattle.

Getting cattle into, and out of, these pens is accomplished easily by driving them through the 16-foot alley on which each pen fronts. Each pen is equipped with a 16-foot steel gate which can swing out to block the alley and direct animals into any of the pens. To save money, Matthews substituted crushed stone for concrete on the floor of the alley.

This alley has its beginning in the weighing and handling center where cattle check in and out of the lots. Here there is a loading chute to accomodate double-deck tractor trailers, a set of scales, essential to this type operation, holding pens, and a squeeze chute all of which are accessible from the alley.

Feed Center—The Hub

Any plan that calls for finishing 900 head of cattle a year demands storage for large quantities of feed. A year's feeding demands 600 tons of silage plus 24,000 bushels of shelled corn. Storage for this feed accounted for a major part of the cost.

For storing corn silage Matthews chose two 20x50 foot monolithic concrete silos. Next they erected two 20x50 foot Harvestores each with a 12,300 bushel (dry weight) capacity for high moisture corn. "We blow corn into them," he says, "when it is about 28 percent moisture. That saves farm drying or hauling it back and forth to town. It also provided us some added corn storage which we needed badly."

The concrete silos, which have six-inch

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Each lot and barn is divided in two by the feed bunk and straw pile. With a dividing board, different feeds can be fed on each side of the bunk. With little change the lots could be used for pigs.

new tests at NEBRASKA

Four new runs have been added to the Nebraska Test, the first big changes in 40 years.

By John MacCallum

DURING 1958 and 1959, four important additions were made to the Nebraska Tractor tests, which have otherwise remained almost unchanged since the first test in 1920.

These additions were the result of farmer requests for tests to compare new types of transmissions. A test of lugging ability was devised and added in 1958. A test of tractor horsepower available at the pto, and two new runs of its drawbar power and fuel consumption were added in 1959.

With these additions to the test, farmers of Nebraska—and the world for that matter—are able to see how practically any make and model tractor produced today performed under carefully controlled test conditions. Each run made is recorded, and printed copies of the test results can be secured from the University of Nebraska, Tractor Testing Station, Department of Agricultural Engineering, Lincoln, Nebraska.

The first Nebraska test was on the Waterloo Boy, an awkward-looking steel-wheeler, burning kerosene in its twin cylinders. It was a far cry from today's high-speed engines, with many times more power, newer transmissions and hydraulics. That tractors have improved, yet the test remained almost unchanged for 38 years, is a measure of the forethought that went into that first test on March 31, 1920.

First American Tests

Tractor testing in the Americas began in Canada at the Winnipeg Motor Contest in 1908. This first contest was a crude affair. The various engines pulled loads, and plowed some ground, and the judges decided which was best.

L. W. Chase, writing about these early tests in 1913, said, "The competitors considered that first contest more or less a joke, not even considering it of enough importance to send men to Winnipeg to look after their outfits. But the motor contest developed until it became so important that nobody but the best engineers were sent to take charge of the outfits and the competition. Whole office forces vacated the factory to go to Winnipeg and keep track of their outfits and the others in the contest.

"A peculiar feature was noticed in 1911. As soon as an outfit commenced to have trouble the crowd commenced to assemble about it. The reason for this was to learn the trouble and avoid it in their own designs." The average cost for entry at Winnipeg was about $1800. International Harvester and J. I. Case both had tractors in the Winnipeg tests.

Although 1913 was the last year of the Winnipeg Motor Contest, other contests, competitions and tests of agricultural tractors flourished all over the world. Germany and South Africa had contests in 1913.

For a farmer who wanted honest information on a tractor these demonstrations were not much help. Conditions of the different contests varied widely. A tractor tested in Canada might give a very different performance in a Fremont, Nebraska, contest, or the Wichita, Kansas, demonstration. Skulduggery was common. In some cases, the results of the test were not given to the public, but there was some pirating of the results. Various companies would publish them either officially, or unofficially, to promote their product and sell short the opposition. More than once a tractor with some dire internal problem would grind to a halt. But the driver would pitch from the vehicle, holding his belly and writhing in agony. A panting team of works officials would carry him groaning to a hospital. The team, of course, was too upset to continue the contest. Late that night a band of company servicemen would slip in to overhaul the tractor. Nothing was wrong with the driver. His acting was good, to cover deficiencies in his machine.

By 1919 the attendance at these demon-

strations had begun to drop off substantially. The public was tired of watching field tests; the newness of the tractors had worn off, and in many cases they could not see or analyze the data. Many of these national and regional competitions were discontinued. But the need for accurate performance data obtained under good engineering procedures still existed.

There were other pressures for a good and honest test. In 1919 the National Vehicles Association requested the Department of Agriculture to make tractor tests. The USDA declined because members of the Agriculture Committee felt this work should not be done by the Department.

A law was proposed in the North Dakota legislature to protect farmers who felt that their tractor was not giving the power claimed by the manufacturer. They could have the tractor tested by the state for a small fee, and if the tractor did not develop the power claimed for it the company could be fined. This rather rough law never passed. But in the spring of 1919 the Nebraska Legislature voted overwhelmingly to set up a tractor test.

Nebraska came by its tractor testing bill in a strange way. In 1915 a Minneapolis tractor company (not Minneapolis-Moline) hired a chief engineer whose last name was Ford. Not long after his employment this enterprising company renamed its tractor "The Ford Tractor." The company even went so far as to call its tractor the Model B. (The other "Ford" Company run by Henry Ford had not at this time sold an agricultural tractor.) Henry Ford produced an experimental model in 1906 using parts from the Model "K" Ford and binder wheels in the rear. When Henry Ford finally marketed a tractor he called it the Fordson.

A farmer near Osceola, Nebraska, bought one of the first "Ford" tractors. It did not take him long to find out it was a poor machine. W. F. Crozier was not the only farmer to have trouble with the so-called Ford Tractor, and the company soon went out of business. But Crozier and others came to the staunch belief that Nebraska farmers should be protected from frauds of this kind. He ran for the state legislature, was elected, and in 1919 introduced the bill which provided for the establishment of a tractor testing station at the University College of Agriculture.

The power tests are recorded on a dynamometer. The power take-off, or occasionally belt pulley, is connected to the dynamometer, which is essentially a big generator. It can put an accurately measurable load on the tractor engine. From this the horsepower can be calculated.

The Nebraska Legislature had the help of several men with engineering experience when they wrote the law. Two of these men were L. W. Chase and O. W. Sjogren. Chase was head, and Sjogren a member, of the Agricultural Engineering Department at Nebraska at the time the law was written. Sjogren was head of the department when the tests began. It was important that these men were available to the Nebraska Legislature to make sure that the bases of the test were good and sound—sound enough to have required very little modification in the last 40 years.

The Legislature passed a bill in 1919 which says that no manufacturer may sell an agricultural tractor in the state of Nebraska without a permit from the State Railway Commission. The fee for the test is $800 plus $30 per horsepower (horsepower here is the old taxable horsepower depending on the bore and number of cylinders).

The Tractor Test

The manufacturer delivers the tractor to Lincoln, Nebraska, where the engineers first review the specifications of the model such as the size of the tires, the battery, the bore, stroke, the radiator capacity. They drain the oil out of the tractor and put in a measured amount of new oil, exactly according to the operator's handbook. They attach a clock to the tractor which records the hours the engine runs and then they allow the manufacturer's representative to operate the tractor for 12 hours. This is the preliminary limber-up run. The manufacturer's operator has time to make adjustments and get the tractor into good condition, but any changing of parts must be mentioned in the test report.

pto Tests

The first series of tests are the belt, or power take-off tests. These are done inside the building using the tractor belt pulley, or pto to drive a dynamometer. (This is a large electric generator which can put an exact load onto the tractor engine. This load can be measured very accurately, and the engine horsepower calculated).

Power Take-off Performance — First run—maximum power and fuel consumption. The engine is run full throttle at the manufacturer's rated engine speed for two hours, to show the maximum horsepower of the tractor engine.

A second run is made for one hour at maximum power for the standard power take-off speed. This is done only when the manufacturer's rated engine speed does not turn the pto at the standard speed of 1000 or 540 rpm.

Varying Power and Fuel Consumption Tests—These are six runs, each lasting 20 minutes. These runs imitate a range of

Almost identical tests were given the Four-Drive tractor in 1929 and the International tested almost 30 years later. The test car in each case measures the load the tractor pulls in the drawbar tests. Other tractors are pulled in gear as loads.

working conditions having varying loads with the governor controlling the engine speed.

The first is made at 85 percent of the maximum load or "torque" calculated from the first maximum power run. This is considered an average "working" load.

The next run is on minimum load to give the idling speed of the engine.

The next is at one-half of the 85 percent torque.

The fourth is at maximum power, and this should give somewhere near the same result as the maximum power run.

The fifth run is at one-fourth of the 85 percent torque.

The last run is at three-fourths of the 85 percent torque.

The average of these six tests is calculated and recorded. This average gives the farmer an idea of normal fuel consumption, for average farm conditions.

Drawbar Performance

MAXIMUM POWER WITH BALLAST—This test is run with the tractor weighted (tire liquid, wheel weights, etc.) to give the drawbar performance expected by the manufacturer. It is run in every gear having a speed under 15 mph, unless the slippage of the wheels exceeds 15 percent (or 7 percent for track layers), which it quite often does in the lowest gears. No test is accurate with high wheel or track slip. The drawbar pull for the lowest gear tested is the maximum pull for this tractor at this weight on a hard surface.

VARYING POWER AND FUEL CONSUMPTION WITH BALLAST — There are three divisions in this test, all run in the gear that is expected to be used most. With wheel tractors they choose one with a speed of about 4 or 5 mph. They give an idea of the fuel economy of the tractor. The first run is at the maximum available horsepower—the highest horsepower the tractor can maintain around the test course without loss of speed. This lasts 10 or 2 hours. (One endurance run for 10 hours is required by law.)

The next is 10 or 2 hours at 75 percent of the pull at maximum horsepower.

The last is 2 hours at 50 percent of the pull at maximum horsepower.

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—This is a measure of the lugging ability of the tractor. "Lugging" is the ability of the tractor to work through tough going. The engine slows down, the drawbar pull increases, and the rough patch is passed without changing gear. The first test is at maximum power. Then the pull on the tractor is increased so as to reduce the speed about 10 percent. The tractor pulls harder. For five successive steps the drawbar pull on the tractor is increased to reduce the speed about 10 percent or a total of 50 percent from first to last run. The increase in drawbar pull with which the engine responds to an increased load gives an idea of how well the tractor will work through a tough patch of ground during field work, without changing gear.

MAXIMUM POWER WITHOUT BALLAST—This test gives the farmer an idea of how the tractor will perform without any additional weights (except for the weight of the driver).

The Supervision of the Test

The engineer in charge of the test is L. F. Larsen, a personable, greying engineer's engineer who has worked with the Nebraska test since 1946. "The test still has its place," he explained recently, "in controlling excessive claims and discovering weaknesses. Some of the early weaknesses were downright dangerous. For example, in Test Number 15 in 1920, the report said, 'The morning after the brake test had been completed, the engine was started in the usual way, gained speed rapidly and after only a few revolutions, the clutch and belt wheel broke into many pieces, which were thrown in various directions.' Although the early failures were more frequent and sometimes hazardous, we still have breakdowns today. Quite recently a manufacturer was not satisfied with 4,600 pounds of pull in the maximum power with ballast test. They said their factory tests had shown at least 5,600 pounds pull and asked for more ballast to be put on the tractor to reach this higher figure. In the re-run of this test, one of the main transmission gears broke, and the tractor would move no more. We even had difficulty towing it," laughed Larsen. "In another recent test, so much weight was added to the tractor that a tire slipped on the rim and tore out the valve stem."

Much of this over-enthusiasm for high horsepower and high drawbar pull figures in the Nebraska test comes from the advertising departments of the various manufacturers. They naturally want the highest figure to use in publicity.

The horsepower of a tractor is quite often misrepresented. Last year, of 49 tractors tested at Nebraska, 19 were advertising at least one more horsepower than was observed in the Nebraska test. One Diesel model advertised as an 80 horsepower tractor (equipped with only a drawbar) actually gave 40 horsepower at the drawbar. Another manufacturer's liquid petroleum gas model was advertised at over 60 engine horsepower, and in the Nebraska test gave under 47 horsepower at the pto.

A confusing range of figures can appear between manufacturers' tests and those run at Nebraska because horsepower figures are not all taken in the same way. Often the manufacturer will give the horsepower of the engine without accessories; that is, no fan, no generator, no hydraulic units. This, of course, gives a much higher horsepower than is available in the field. The next largest figure is the horsepower available at the power take-off, or belt pulley. The engine, which is driving accessories and transmissions, has less power available for pto use. The horsepower at the drawbar has already driven the transmission, and lost power because of wheel slip. It is the lowest figure of the three. The "naked" engine horsepower as claimed by the manufacturer is a useless figure, since it gives little idea of the tractor's performance. The pto horsepower, or the drawbar horsepower are the only figures that can be used by a farmer.

Users and Makers

Professor L. W. Hurlbut, friendly, talkative Chairman of the Department of Agricultural Engineering and one of the Board of Tractor Test Engineers, said, "For the 40 years of the test, the university has been aware of the two bodies of interest involved—the buyer and the manufacturer. They both have a different interest in the tests. A good analogy," he said, "might be made to a field. You have a fence around the field, and the area in the middle. The outlook of the manufacturer is like the fence. He is more interested in the boundary conditions, the 'maximums,' whereas the farmer is interested in the whole range of operation in the middle of the field. The maximum horsepower available and the maximum drawbar pull are

(*Continued on page* 116)

How to Interpret a Nebraska Test

The report on every tractor tested at Nebraska is printed in the form shown in miniature below. On the opposite page is an explanation of the important figures recorded. This test was on a wheel-type tractor, with rear-wheel drive, tested in 1959. The area emphasized with a yellow tint is the heart of the test from a farmer's point of view. In addition to the performance data, a farmer might be interested in the specifications shown on the right-hand column of the sheet below. At the bottom of the specifications is a note on repairs and adjustments during the test, and other remarks. The reverse of the test sheet explains the test report.

A single copy of any test report is obtainable, free, from The Department of Agricultural Engineering, Tractor Testing Department, University of Nebraska, Lincoln, Nebraska.

NEBRASKA TRACTOR TEST 701 -

University of Nebraska Agricultural Experiment Station
W. V. Lambert, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

MAXIMUM POWER AND FUEL CONSUMPTION

Rated Engine Speed—Two Hours

Standard Power Take-Off Speed (1000 rpm)—One Hour

VARYING POWER AND FUEL CONSUMPTION—TWO HOURS

DRAWBAR PERFORMANCE

VARYING DRAWBAR POWER & FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—6th Gear

75% of Pull at Maximum Power—Two Hours—6th Gear

50% of Pull at Maximum Power—Two Hours—6th Gear

MAXIMUM POWER WITH BALLAST

MAXIMUM POWER WITHOUT BALLAST

VARYING DRAWBAR PULL & TRAVEL SPEED WITH BALLAST—6th Gear

TIRES, BALLAST and WEIGHT

Rear tires

Front tires

Ballast

Total weight with operator

Wheel Tread

Rear

Front

Wheel Base

Rear

Front

Ground Clearance

Rear axle

Front axle

Weight distribution

Rear

Front

Department of Agricultural Engineering
Tractor Test No. [redacted]

Manufacturer's Power Rating Not Rated

FUEL, OIL and TIRE Fuel engine gasoline
Octane No. 93 FM 85 Research 93 (mixing information)
Engine crankcase capacity 8 qts
Specific gravity recommended at 60° F 0.7500
Weight per gallon 6.25 lbs
API service classification MS and DG
Transmission and final-drive lubricant Ford Specification M1C 41 A
Total lube capacity 30 qts
Tires

ENGINE Make [redacted] Model [redacted] Serial No. 6409 Crankshaft governed speed 2200 rpm
Rated rpm 2075 Bore and stroke 3.500 in. Number of cylinders 6 Valve arrangement L-head
Displacement 203 cu in Compression ratio 7.5:1 Ignition system
Battery 12 volt Starting motor
Governed speed checked with tachometer
Oil filter full flow with replaceable paper element
Air cleaner

CHASSIS Type standard Serial No. 6409
Tread width rear 57" to 76" front 57" to 80"
Wheel base 115"
Clutch 11" Ferodo single plate
Transmission 6 forward speeds and 1 reverse
Differential
Final drive
Brakes
Steering

TRACTOR WEIGHT Tested as received
Rear tires
Front tires
Ballast
Total weight with operator

DRAWBAR PERFORMANCE

Maximum power—Two hours
Rear wheel speed 1411 rpm 5 mph
Engine speed 2075 rpm
Drawbar horsepower 70.00
Drawbar pull 1680 lbs
Travel speed 5.00 mph
Slippage 2.4%
Fuel consumption 1.70 gal per hour
Specific fuel consumption 0.606 lbs per hp hr

75% of pull at maximum power—Two hours
Rear wheel speed 1511 rpm 5.35 mph
Engine speed 2220 rpm
Drawbar horsepower 60.00
Drawbar pull 1680 lbs
Travel speed 5.35 mph
Slippage 1.2%
Fuel consumption 1.45 gal per hour
Specific fuel consumption 0.484 lbs per hp hr

50% of pull at maximum power—Two hours
Rear wheel speed 1611 rpm 5.70 mph
Engine speed 2365 rpm
Drawbar horsepower 47.70
Drawbar pull 1680 lbs
Travel speed 5.70 mph
Slippage 0.4%
Fuel consumption 1.20 gal per hour
Specific fuel consumption 0.377 lbs per hp hr

MAXIMUM POWER WITH BALLAST

MAXIMUM POWER WITHOUT BALLAST

VARYING DRAWBAR PULL & TRAVEL SPEED WITH BALLAST—6th Gear

TIRES, BALLAST and WEIGHT

Rear tires

Front tires

Ballast

Total weight with operator

Wheel Tread

Rear

Front

Wheel Base

Rear

Front

Ground Clearance

Rear axle

Front axle

Weight distribution

Rear

Front

REPAIRS AND ADJUSTMENTS A wheel weight exposed bolt broke during the maximum available power run allowing the exposed weight to fall off. After the run was completed the end of the bolt was cut and a new bolt

REMARKS All tractors were determined from chainsaw data obtained in accordance with SAE and ASAE test code. First, second and third gears were run for a short distance to load the pull to fourth gear to avoid excessive slippage. Tests were run at 2 mph for one hour with the engine governed at 2200 rpm. The engine is governed by mechanical governor. Fuel consumption was by weight. Fuel-tank measurements

We, the undersigned, certify that the data and curves report of official Tractor Test No. [redacted]

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT, Chairman
L. W. STEPHENSON
J. L. BURR
Board of Tractor Test Engineers

How to Interpret a Nebraska Test

This shows the effectiveness of the governor. During 1959, the average engine speed of these tests was 121 rpm above the rated speed. Or, figure 10 per cent higher than the rated speed is ok. The top rpm here, 2396 is within 10 per cent above 2,200.

46.16 This is the maximum horsepower available at the power outlet. Don't count on it for continuous use.

39.04 This is the maximum horsepower with the engine speed adjusted so the pto is doing 540 (or 1,000) rpm. Note lower rpm in next column. The manufacturer's rated speed would turn the pto too fast.

40.77 A user should think of this as the highest usable horsepower. It is about 85 per cent of the maximum, and leaves some reserve for hard going. This tractor has a "working" maximum of 40 horsepower. But for heavy continuous loads like irrigation pumping you should plan to use about ⅔ of this figure.

45.57 This is also a test of the maximum horsepower available at the power outlet. But in this test the load is changed every 20 minutes. Temperatures, clearances, friction, etc. change the maximum slightly from the figure at the top of this column which is 46.16, obtained in a two hour test.

This is the heart of the Nebraska Test for the farmer. These are the operating characteristics in the useful ranges.

37.02 and 3347. With a torque converter in the transmission, a farmer can use these figures for load and horsepower in planning field work.

30.08 and 2486. These are the horsepower and drawbar load figures to use in planning field operations with a tractor with standard transmission or automatic shifts WITHOUT a torque converter in the transmission. 37.02 is the maximum "available" power, but don't count on it for continuous use.

5158 This is the drawbar pull the tractor develops on a hard, dustfree surface, with a lot of wheel weights. You cannot expect to get or use this pull in the field. But it does show this high pull did no damage.

These two figures (37.07 and 32.73) and their drawbar pulls (3339 and 2949) are similar tests, but the lower figure is the tractor without any added weights. In the same gear, without weight, the slip was at the 15 per cent limit, and therefore the horsepower and pull are lower.

This is the temperature of the water in the upper part of the radiator. A range of 160° to 190°F. is normal. With a pressurized radiator the top figure should be higher, but not more than 220°F.

Humidity affects engines differently. The difference between this column and the dry bulb column gives the humidity from commonly available tables. This column is lower than the dry bulb column. The bigger the difference, the lower the humidity.

Air dry bulb is the regular temperature. High temperature can lower the horsepower, so the power outlet tests at Nebraska are run at between 75° and 85°F.

A rough rule of thumb is "For every 1,000 feet you raise the altitude, you get 3 per cent less horsepower". Also: "For a 10°F. rise in temperature of the air, you get a reduction of one per cent in horsepower" These are just rough estimates.

2.784 This is the gallons of fuel per hour a farmer can expect from this tractor.

This test starts with the run at maximum power. Drawbar load is added to show the lugging ability of the tractor. Pull is not highest when horsepower is highest.

This tractor could lug 350 pounds more than the pull at maximum horsepower. For good lugging ability, this figure should be about ten per cent higher than the pull at maximum horsepower. This tractor is ok. Some engineers believe lugging figures should not be stressed, as designing an engine for lugging ability might change qualities like horsepower or fuel economy.

6717 This is the total weight of the tractor with ballast. There was more than 1½ tons of ballast added to this tractor in the drawbar tests. Without the weight the maximum drawbar pull was 2949 pounds. With weights, it was 5138. Without weights, wheel slip was the limit, even on a hard surface. For best work with this tractor, some additional weight is needed.

Sixth gear is selected by the manufacturer for this test as the gear expected to be used most of the time. The speed of the gear chosen is always between 4 and 5 mph.

This column shows the number of horsepower one gallon of fuel will feed for one hour. The higher the number the better the fuel economy.

8.94 This figure (horsepower hours per gallon at 75 per cent of pull at maximum power) has ranged from 6.17 to 16.46 in recent tests. Compare the figure for various similar tractors. This difference is due to fuel, and engine design.

2.769 This is the number of gallons per hour fuel consumption a farmer can expect in average field operation. Note this figure is similar to the fuel use average for the six tests of pto power (2.784) above. If the drawbar figure (2.679) was much higher than the pto figure, this might indicate unusually high losses in the transmission.

14.01 This is the per cent wheel slip in fourth gear. First, second and third gears are not shown because the slip was more than the 15 per cent limit. For crawlers the limit is 7 per cent slip. When wheel slip for wheeled tractors is more than 10 per cent the drawbar pull measurement is not very exact.

Note this tractor has a number of gears with close speed steps for making close adjustments in speed-load relationships.

This tractor has ten gears. Tenth gear was not tested as the speed exceeded the 15 mph safe limit for the test course.

This tractor is too light for use without some ballast. The drawbar pull had to be reduced to keep wheel slip down. The key here is the engine rpm. When pull was reduced to keep slip below 15 per cent, the governor controlled the engine speed, and the rpm ran 2095, higher than the rated speed of 2000. Under full load, the load limits the engine speed to the rated figure, around 2,000 rpm.

Most wheel tractors tested at Nebraska have been light. This is in part intentional, as manufacturers expect mounted machines to be used to add weight.

The operator weighed 175 pounds.

POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Air wet bulb	Air dry bulb	Barometer Inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
46.16	2200	3.816	0.513	12.10	184	67	75	28.930
Standard Power Take-Off Speed (1000 rpm)—One Hour								
39.04	1732	3.126	0.497	12.49	169	65	74	28.935
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
40.77	2287	3.705	0.564	11.00	180	66	76	.....
4.29	2396	1.585	2.294	2.71	156	65	73	.....
20.94	2348	2.522	0.748	8.30	168	67	77	.....
45.57	2201	3.797	0.517	12.00	185	65	74	.....
10.65	2380	1.952	1.140	5.45	159	66	75	.....
31.04	2319	3.145	0.629	9.87	173	66	76	.....
Av 25.54	2322	2.784	0.677	9.17	170	66	75	28.985

DRAWBAR PERFORMANCE

Hp	Drawbar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temp Cooling med	Degrees F Air wet bulb	Air dry bulb	Barometer Inches of Mercury
VARYING DRAWBAR POWER & FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—6th Gear											
37.02	3347	4.15	1993	8.26	3.467	0.582	10.68	170	59	68	29.105
85% of Pull at Maximum Power—Two Hours—6th Gear											
30.08	2486	4.54	2122	5.80	3.363	0.694	8.91	190	73	88	28.767
50% of Pull at Maximum Power—Two Hours—6th Gear											
21.49	1705	4.73	2163	3.77	2.769	0.800	7.76	182	76	95	28.708

MAXIMUM POWER WITH BALLAST

27.87	5138	2.03	213	14.01	4th Gear	184	67	77	29.010
36.28	4322	3.15	200	10.93	5th Gear	201	74	91	28.955
37.07	3339	4.16	200	8.47	6th Gear	201	67	90	28.960
37.22	2879	4.85	200	7.08	7th Gear	200	72	91	28.960
37.22	2200	6.34	199	5.43	8th Gear	200	72	91	28.960
36.76	1309	10.53	200	3.13	9th Gear	200	72	91	28.960

MAXIMUM POWER WITHOUT BALLAST

32.73	2949	4.16	2095	14.12	6th Gear	186	75	92	28.790

VARYING DRAWBAR PULL & TRAVEL SPEED WITH BALLAST—6th Gear

Pounds pull	3350	3550	3600	3700	3300	3350
Horsepower	37.0	35.0	31.7	28.6	23.3	18.8
Miles per hour	4.2	3.7	3.3	2.9	2.5	2.1

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No. size, ply & psi	Two 13.6-28;4;14	Two 13.6-28;4;14
Ballast	—Liquid	312 lb each	None
	—Cast iron	1094 lb each	None
Front tires	—No. size, ply & psi	Two 6.00-16;4;28	Two 6.00-16;4;28
Ballast	—Liquid	48 lb each	None
	—Cast iron	128 lb each	None
Height of drawbar		19 inches	20½ inches
Static weight	—Rear	4860 lb	2048 lb
	—Front	1682 lb	1340 lb
Total weight with operator		6717 lb	3363 lb

By Max B. Heppner

Hilly-Brook Ponds

A Wisconsin beefman shows how he maintains his ponds for protection, profit, and pleasure.

WISCONSIN FARMERS are building farm ponds, which until recently were a rarity in the land o' lakes. Wisconsin pond pioneers, like Stan Herrling of Cross Plains, however, can call on the experience of nearly a million farmers in the rest of the country who have built and enjoy ponds. In turn, many of his neighbors come to Herrling's Hilly-Brook Bar-Low Ranch for his experiences as a pond owner.

Herrling started on the soil and water conservation plan that included pond building five years ago, because, in his words, "these 200 acres were the poorest, most rundown land in the township. The fields had been mined with row crops till they produced no more than 14 bushels of corn to the acre."

The ponds help stop runoff water on the hilly farm and at the same time protect a whole valley below. The Hilly-Brook acres drain into the Black Earth Creek which floods dangerously after a heavy rain. As the first of a series of small ponds to stop big floods, Herrling's dams will hold back runoff water from 354 acres when his pond plans are completed.

"My farm is all conservation farm," Herrling explained when describing his land management program. "I keep 80 acres in woodland; the balance is in meadow. There are 120 acres of it—all cut for hay and silage. Grass is what should always have been grown here. I have put on fertilizer—$2,000 worth the first two years—and all the lime necessary. Now I get about five tons of hay to the acre, and I doubt that there are any farms in the county that can beat our record."

He feeds most of his grassland harvest to some 150 top grade Herefords. He has beef cut to order under the Hilly-Brook label for customers in the area around Madison, where the farm is located.

When a group of farmers comes to talk ponds, Herrling likes to give them a general idea of the layout before going into details.

"See," he explained to the last group that came by, "the ponds start where my wife is sitting under that clump of trees. Right there is a spring that fills my trout pond."

The group walked over, and Herrling tried to make the trout jump for some feed pellets. Three throws failed to produce a single trout snout. Herrling probably figured the trout wouldn't go for a fourth pitch, so he continued his survey.

A two-acre pond, the first real sky pond, as runoff catchers are called, lies below the trout pond. Still lower, machinery idled by Sunday rest stood around a dry excavation. Soon a second sky pond, five acres in size, will be filling there.

The introduction was quickly followed by questions. Like Herrling, the future pond makers in Wisconsin expected to have conservation engineers plan their new water and to have contractors convert the blueprints to reality. What they wondered about was —when the pond is built, then what? What about rough winds and waves? Or burrowing animals? What's the chance of a water fight—not boys splashing water, but a legal battle over damages? They had heard silt in runoff water fills ponds. Did it? What about landscaping, taking care of fish, fighting weeds?

"In a well-built pond," Herrling began, "you hardly have to worry about these things. I did keep an eye open for wind and choppy waves. The conservation people said I might have to set some stones against the dam, if there was much wash during rough weather. Actually, the ponds lie low enough so the wind generally blows above water level. Still, I'll watch for waves on the five-acre pond after it fills."

If the dam needed some protection, it would not be hard to provide. Strips of stone that touch or overlap on the slope where the waves hit would do it. This rip-rap would stretch from 6 to 12 inches above the water level to 24 inches or more below normal fill.

The stones could also afford some protection against muskrats. Pond owners don't want muskrats as pets. They say rat poison with warfarin is as delicious and as deadly to muskrats as to barn rats. One man even suggests dynamite— not to blow the vermin up, but to poison them. Dynamite sticks are dessert to a muskrat.

"Do other animals bother the pond, Stan?" a visitor asked.

"Not unless you mean two-legged ones," said Herrling, whose answers are always as straight as his look when he talks to you. "People! I'm sorry it is that way, but when you get a group of them together, there are always a few inconsiderate ones. I don't want to keep a beautiful spot like this to myself, and I share the beach, the boats, the pier and other gear even with uninvited guests. Last Sunday I counted 40. What was discouraging is that when they left, I found all sorts of trash on the beach and a mass of chairs, liferafts and other gear bobbing around in deep water."

Herrling tries to keep people from swimming alone. Liferafts are handy in case of mishaps. A 32-foot pier allows a far reach into deep water if someone needs to be pulled out. Herrling's liability arising out of ownership of the ponds is covered by a $200,000 public liability policy for the whole farm. The annual premium is $56.50.

Maintenance of the ponds requires very little work and expense. The acres

(Continued on page 111)

A well-built pond comes close to all play and no work. One chore is constant fishing to keep from overcrowding the pond. The safest boat for fishing or a cruise (left) is one with air compartments that keep it from sinking if capized. Seining (below) shows small bluegills of uniform size, a sign that the pond is overcrowded. A well-balanced pond would have fish of varying sizes, both bluegill and bass, with very few or no tadpoles or crawfish.

Limited Integration in Hogs

IF THE PRODUCERS who develop quality hogs are to get in on the payoff they may have to develop their own marketing setup. This sentiment one hears with increasing frequency throughout hog feeding areas. Like all proposals for solving agriculture's ills it is producing a lot of conversation. In a few spots it has generated some action. Nothing spectacular, but at least someone has started rolling the snowball and if he gets it over the crest of the hill there may be some interesting and wide-spread results.

Stocky, close cropped Dick Cummins, manager of the Producers Marketing Association, at the Indianapolis Stock Yards is one of these ball rollers. He is as direct in his actions as in his speech. His speech goes like this:

"I have a few firm convictions. One is that the livestock producer must raise what the consumers want. This also means that if the product costs more, the consumer should pay for it and the producer should have a way of getting most of this increase rather than seeing it dissipated into the hands of the middleman.

"I am also convinced that hog production must be geared to a steady year-round output and must get away from seasonal gluts and scarcities. I refuse to buy the hog cycle as necessary."

With that philosophy as a guide Producers Marketing Association a few years back got together with the Indiana Farm Bureau Cooperative Association to set up a plan to help the farmer produce quality meat-type hogs, to help him finance the operation and to provide a market outlet which would assure him a return commensurate with his increased efforts and expenses. While in the very broad sense this might be called a limited form of integration it definitely leaves the swine grower in the position of an independent operator with few restrictions on his decision making. It will bear watching by anyone connected with the hog business.

Alas, poor York! He was meat-type; and look what it got him. But how about the man who raised him? He did a lousy job of marketing and wound up on the same hook.

Essentially, it is a project in which farmers in southern Indiana, a poor corn growing and feeding area, produce quality, meat-type feeder pigs which the Producers Marketing Association buys and immediately re-sells to feeders in the central and northern parts of the state. These feeders agree to use the feeds and supplements of the Farm Bureau Co-op, which is prepared to furnish these materials and assist in arranging finances, if needed. The feeders also agree to market the finished hogs through the Producers Marketing Association.

The plan is simple; but it offers opportunities to branch out in many directions. The first of these to be followed up was the establishment of a trade name, "Tend-R-Leen," under which it is hoped all pork from quality hogs raised and fed under the plan will eventually be marketed. It is intended that this name will be identified with the product from the time it goes to market until it reaches the consumer's table.

"The first thing a quality producer must do if he is to cash in on his efforts is to identify his product," Cummins says. "If the housewife finds every time she buys 'Tend-R-Leen' she gets the same tender, tasty pork without a lot of fat, she will ask for it by name and she will also be willing to pay a few cents more for it.

"We hope eventually we'll have enough producers working with us to give us enough volume to guarantee a packer or a retailer, or both, a known quantity and quality so he can do a first-rate job of merchandising and we can pass a large part of the benefits back to the farmer in better prices."

The "Tender-R-Leen" hogs bring their producers 50 cents a hundred premium. From this 2 cents a head is deducted for a fund to promote the production of "Tend-R-Leen" pork.

The Association's agreements (they are not referred to as contracts) are of two kinds, a Production and Marketing Agreement

for the feeder pig producers; and a Hog Feeding and Marketing Agreement for the feeders.

Farmers who enter into one of the feeder pig agreements (many are part-time farmers) must also abide by the following rules:

1) Remove needle teeth at birth.
2) Castrate pigs not later than 10 days of age.
3) Vaccinate with modified vaccine for cholera at 4 to 6 weeks of age, or at the time of delivery.
4) If pigs cannot be moved to clean pasture within 3 days after birth, producer must place clean sod in pens for pigs, or use some approved method of iron medication, or both, to prevent anemia.
5) Mark gilt pigs weighing 3½ pounds or more at birth and from large litters (10 or more farrowed) for possible use as breeding stock.
6) Feed full allowance of "Faro-Ettes" and/or "Creepettes" until pigs weigh 40 pounds.
7) Follow a program of sanitation and feeding that will produce pigs relatively free from disease, internal and external parasites.
8) Have facilities adequate for the number of sows and for maintaining clean and sanitary quarters.

Most of the producers are on twice a year farrowing, though some farrow every other month. "We'd just as soon most of them didn't get into year-round farrowing," Cummins says, "until we know more about disease control. If we can stagger production between farmers we can whip the hog cycle just as effectively as if everybody went to multiple farrowing."

The Association has a field man who periodically checks on the various setups; and if the farmer finances his livestock through a bank or a PCA he will be subject to further supervision from this source. Still, the only points where the producers really surrender their independence are in the selection of breeding stock, in tying themselves to a specific feed program, and in agreeing to sell through Producers Marketing Association.

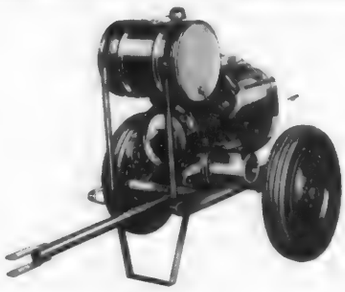
The program has been in existence just two years. It numbers several hundred cooperating farmers. Despite the severe break in hog prices last fall and winter the only feeder pig

(*Continued on page* 102)

These feeder pigs produced in southern Indiana under contract with the Producers Marketing Association of Indianapolis are being delivered to the Association for sale to hog feeders in other parts of the state. They are the produce of specially selected boars and sows. When ready for slaughter a high percentage of them will grade up to Producers' "Tend-R-Leen" specifications and command a premium on the market. Boar testing, as carried on in modern evaluation stations such as this one (left) belonging to the Consumers Cooperative Association of Kansas City, is an integral part of any program to get the producer a better return for better pork.

Limited Integration in Hogs

One of the essential points swine raisers must keep in mind is that they must produce a quality product. Meat-type carcass is the current key-word in the industry. But just as important, they must find a way to capitalize on this improved product and get a better return when they market it. Producers Marketing Association of Indianapolis has a program going that may be a model for working on both these angles. For the better product they contract with farmers in southern Indiana to produce select feeder pigs which they sell to feeders in other parts of the state. These feeders likewise agree to follow a controlled feed program and—this is where the other angle comes in—to market the finished hogs through the Association. Hogs which grade up to the Association's "Tend-R-Leen" standards (a registered name for a quality consumer product) command a premium. As in integrated arrangements, the Association selects the breeding stock and controls the feeding program. But the farmer owns the livestock and retains the right to make most of his management decisions.



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LIMITED INTEGRATION IN HOGS

(*Continued from page* 101)

producers to drop out were three who left farming completely.

The pig producers like the plan because it has given them a solid marketing program as well as a better product to sell. For some it has even meant a brand-new source of income. The feeders like it because it provides them with a reliable source of healthy, quality stock with good feed conversion. They know where they can get what they want when they want it.

The restrictions on the selection of breeding stock are to insure the production of meat-type hogs of uniform quality. "The farmer can use just about any breed he desires," Cummins explains, "and if he has gilts or sows which come up to our standards he can keep them. He must keep a minimum of 10 brood sows. If he is starting from scratch we want to buy his gilts for him, and no matter how long he has been in the business we select the boars."

All the boars used are performance tested stock from the swine evaluation stations at Purdue or Ohio State. This past spring they were costing the producers about $100 apiece. The Association feels its trained men who have constant experience in buying breeding stock can do a much better job than an individual who buys only a few times a year.

"We had the experience once of sending a farmer to pick up two boars we had bought for him," Cummins says. "The man we bought them from had another boar we had turned down for certain defects. This breeder was a first-class salesman, though, and before our farmer left his place he had sold him this rejected boar—as a real bargain, of course. After that experience we won't even let our customers go to pick up their stock."

Producers Marketing Association takes delivery of the feeder pigs every other week throughout the year at Milltown and at Springville, Indiana. Forty pounds is the desired weight. Anything less than that is unacceptable. A formula has been worked out for pricing these feeders in which the base price for the first 40 pounds is, very roughly, twice the current average price of finished hogs. All weight above 40 pounds brings the top market price. For example: late last winter these feeders were bringing 24 cents for the first 40 pounds, 14 cents (top of the market) for all over 40 pounds. Thus, a 50-pound pig brought $11 ($9.60 for 40 pounds plus $1.40 for 10 pounds). The grower pays the Association a flat $1 per head service charge.

The pigs become the property of the Association but are immediately resold to farmers in the feeding areas of the state at the gross price plus a 50-cent service charge, which charge includes transportation to the farm. Thus a pig which brings its grower $11 will sell to the feeder for $11.50, and the Association collects a total of $1.50 on the double transaction.

The pigs are moved to farmers who can handle at least 100 at a time. Occasionally, arrangements will be made to let a man have as few as 50 on a trial basis. The average feeder takes 200 to 300.

At all times, except for the brief period the Association holds them after purchase from the original grower, the animals are the property of the farmer. Financing of the livestock is usually handled through the local Production Credit Association, or bank.

The farmer who buys the feeder pigs signs a feeding and marketing agreement in which he agrees to follow the feeding program recommended by the Feed Department of the Indiana Farm Bureau Cooperative and to use their feeds and supplements. In turn, the Co-op will assist in arranging finances, if needed.

The local county co-op feedman and the local representative of the Producers Marketing Association keep an eye on the progress of the pigs with one of them visiting the farm frequently. They are available for advice on sanitation and disease control.

The Association does not encourage confinement feeding. "We feel it aggravates the health problem," Cummins says. "And we are finding that hogs which are on concrete all the time are coming up with bone trouble, particularly in the legs. Hogs which have a chance to run on pasture are meatier, too.

When the hogs reach 195 to 225 pounds they are marketed through Producers Marketing Association. Those which grade as meat-type, Tend-R-Leen, get a 50-cents-a-hundred premium. About 65 percent of the market hogs finished under this plan

have been grading up to the specifications. This grading is on the hoof. This, Cummins claims, is as accurate as a man can hit grading carcasses on the rail. "We are 80 to 90 percent correct, as we know from the cut-out of our top-graded hogs. Our blind spot is in not knowing how many potential Tend-R-Leens we have rejected."

In the last analysis it is the percentage of primal lean cuts—the ham, the loin, the Boston butt and the picnic—which determines whether a hog is meat-type. Back fat and length of carcass mean nothing if the animal is deficient in these cuts. The whole controversy over pricing superior hogs revolves around this point. As one observer put it recently, "Somebody is going to have to work out this business of buying hogs on the right basis." The industry is still feeling its way toward an equitable pricing system.

One of the leading packers, for example, is now buying meat-type hogs on the premise that the average 200-pound hog will yield 33½ percent primal cuts. Buyers for this plant are authorized to bid an additional 25 cents per hundred for every 1 percent increase in estimated yield of primal cuts up to 37½ percent. In other words, they can pay as much as $1 more for an extra good meat-type hog.

On the other hand, a representative of one of the big farmer marketing organizations recently commented that "When hogs were at 14 cents the packer could have paid up to $2 a hundred more for the extra good ones and still made money.

"Some good 200-pound hogs will yield as much as 39 percent primal cuts," he explained. "This would give 78 pounds of prime cuts as compared to 67 pounds from a hog yielding only 33½ percent. That's an 11-pound difference. At 60 cents, the wholesale price, it amounts to $6.60. Deduct about 80 cents worth of lard and you still have a margin of $5.80, which makes the better hog worth $2.90 per hundred more on the hoof."

The question is, can the farmer ever get this full premium, whatever it may be. And can a plan like the Producer's, which is now getting only a 50-cents-a-hundred premium, help to bring it about?

"Our goal," Cummins says, "is eventually to control a half million hogs. When we reach that point we can swing some weight in the business and wield some real bargaining power for our producers."

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FACT: Brillion-conditioned hay will be better feed.

PROOF: Additional agriculture college research with various conditioners indicated Brillion-type, steel-roll-conditioned hay produced 15 to 20 percent greater gains per hundred pounds of feed fed. The reason: laboratory analysis showed that Brillion-type steel-roll-conditioned hay tended to be higher in protein and lower in crude fiber—better feed.

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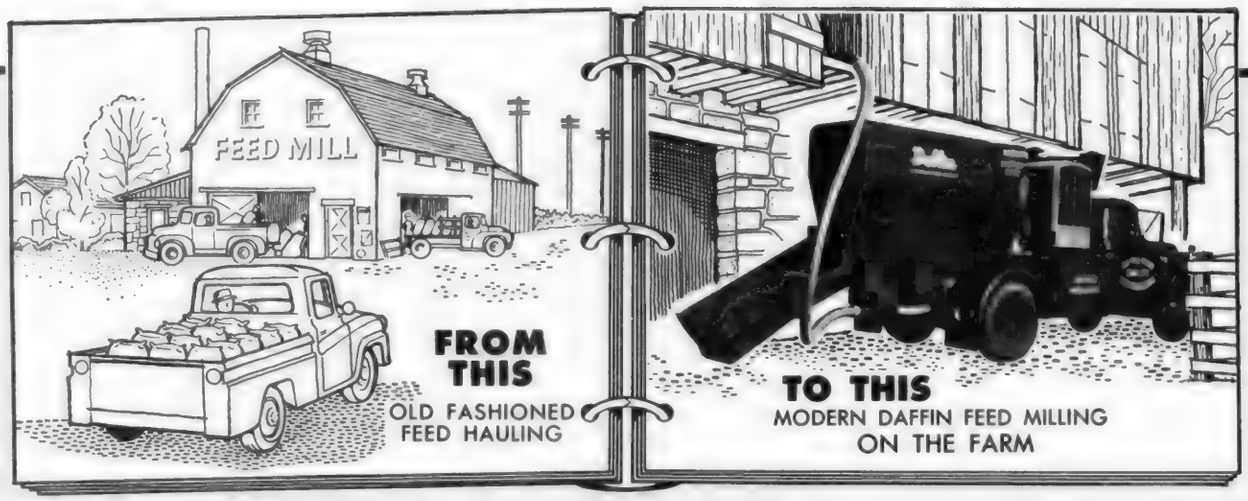

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CORN HOBBYIST

(*Continued from page* 86)

ear of Tom Thumb about the size of an average thumb. "This doesn't make much of a pop," he said, "and the grain is very small, but it's the best-flavored popcorn in the world. This Bear's Paw is an old New England corn, and it's called Bear's Paw because it looks like the paw of an animal. The Strawberry corn is the most beautiful corn you can imagine," he said. "Note the deep crimson color and the translucent grain."

Mr. Keysor reluctantly left popcorn and went on to flint. "I have two varieties of flint corn," he said. "The Yellow Longfellow and the mixed colored Rainbow. This is a very hard, flinty corn," he said. The grains do not shrink when the corn dries. It's not very well thought of for animal food because it's so flinty and a good deal passes through animals when they eat it.

"I grow six varieties of dent corn, which was the old standby of farmers before hybrids came in. Dent corn made the Corn Belt and has been the staple feed for cattle and hogs and people since the Indians gave corn to the white man. Few people know that dent corn is not always yellow. It comes in a variety of colors, and some of it is very beautiful. The fact is, an ear of Blue Clarage is the most beautiful ear of corn in the world."

I had become accustomed by this time

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to Mr. Keysor's quaint habit of calling a number of ears "the most beautiful ear of corn in the world." In spite of the contradiction, I somehow agreed with him.

He continued: "In addition to the Blue Clarage, I have the old, well-known Yellow Dent, the Western White called Silver King, the old-fashioned Southern Hominy corn called Hickory King, the Calico or Bloody Butcher, and the Indian Red. The Indian Red Dent used to be called kissing corn because it was the occasional ear of red corn that gave the finder the privilege of kissing the girl of his choice at a husking bee. Calico and Indian Red occasionally popped up as sports with yellow corn.

"I have only one variety of soft or flour corn, but this one variety comes in colors, blue (a deep blue, almost black), white, and pink, and sometimes in mottled grey when it is cross-pollinated. This was the old standby of the Indians, and it's still grown in the Southwest by the Navajos. It's easy to grind and has a fine flavor.

"I've saved the best for last," Mr. Keysor said, "and that's Pod Corn." He pulled a carton from under a work bench and began to lay out color variations in rows on the barn floor. "There is only one variety here, but, as as you can see, the colors range from a deep purple to white, and from a light tan to a deep brown. The seed for this corn was a single ear grown in Kentucky. The grains are fairly large, but the ears are small and a good yield, with husks on it, is about 15 bushels to the acre. It makes good cow feed because the roughage is built in. The botanists say it's probably the granddaddy of all varieties."

We reluctantly tore ourselves away from the corn and Mr. Keysor took me out and showed me his corn patch of three or four acres of bottom land along the creek. He had cut it all by hand and hauled it to the barn with the exception of some "lazy" corn which grows along the ground like a vine. The stalks were still in the field, but he had taken off the ears. "I grew a stalk of corn here this year that was 15 feet tall," he said. "It was a white hybrid ensilage corn and I didn't give it any particular care. They have grown corn 28 feet tall in Iowa, and I think I could do just as well here if I tried. I have a lot of varieties of stalk here—popcorn, dwarf corn, tall corn, and corn that trails along the ground, but I am not as much interested in that angle as I am in the grain."

I asked Mr. Keysor if he had any trouble

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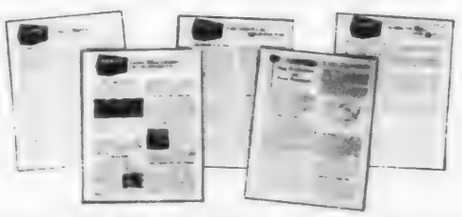

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with cross-pollination since the rows of the different varieties were planted in the standard width. "Not very much," he said, "because most of them have widely different maturing dates. It would be impossible to isolate them here in this area because the wind would bring some pollen in from neighboring farms. This lazy corn matured about the same time as my sweet corn this year, and I had a rather confused mixture. Once in a while when maturing dates are about the same I will get some cross pollination, but those crosses are interesting too. I haven't found that the popcorns cross-pollinate with the other varieties to any great extent."

Mr. Keyser does not commercialize his hobby at all. "Norman spends all his time with that corn," his wife said with a faint note of complaint, "and he's never made a cent out of it. He gives it all away and even forces it on people who don't want it." Mr. Keysor explained that he got as much joy out of seeing other people appreciate his corn as he got out of it himself. "A man writes a poem," he said, "and he wants other people to read and enjoy it. I feel the same way about my corn." He arranges a display for fairs and farm gatherings, and will stand by the booth all day long answering questions and giving away samples. He corresponds and trades corn with other hobbyists.

Mr. Keysor can talk corn 24 hours a day and forget to eat. "The rows of grain on an ear are always even," he said. "The number of rows vary from 8 to 16, go as high as 18. A Navajo Indian once told me that he knew of a tribe in Oklahoma that had a corn with an odd number of rows, but I think he was spoofing.

"To my mind the best eating corn is Country Gentleman, and the best corn for parching is a sweet corn, not the flour corn or the dent. We've tried out most of them, except Pod, and the Country Gentleman, we think, beats them all as eating corn. We've popped all the poppers too. My wife and I aren't much on eating any kind of corn as far as that goes. To my mind corn is for looking at—food for the soul you might say."

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PASTURES FOR CALVES

(*Continued from page* 73)

afford to tie up your land in summer pasture or double cropping. Some fellows sow millet and Sudan grass for summer pasture. This not only throws them late with their winter seeding but uses up a lot of moisture they'd be better off conserving.

"We prepare right around a thousand acres for winter grazing and small grain, about half of it for the calves, the balance for the dairy herd or for cash grains, and that takes time. We shoot for an August 20 deadline for starting to plant and we give ourselves two months to get ready. Those are the two busiest months for us."

First step is to rip open the field to a depth of about 12 inches with an orchard tiller or field cultivator. This loosens the ground so it can be worked all summer and opens it to increase the insoak of rain.

Next operation is a going over with a heavy harrow or a disk plow; then comes a light harrow and drag.

"The idea is," says Weakley, "we start with a deep cultivation, then keep working lighter and lighter until we have a firm seedbed. Summer fallow is another of our objectives to conserve every possible bit of moisture for the use of our seedlings."

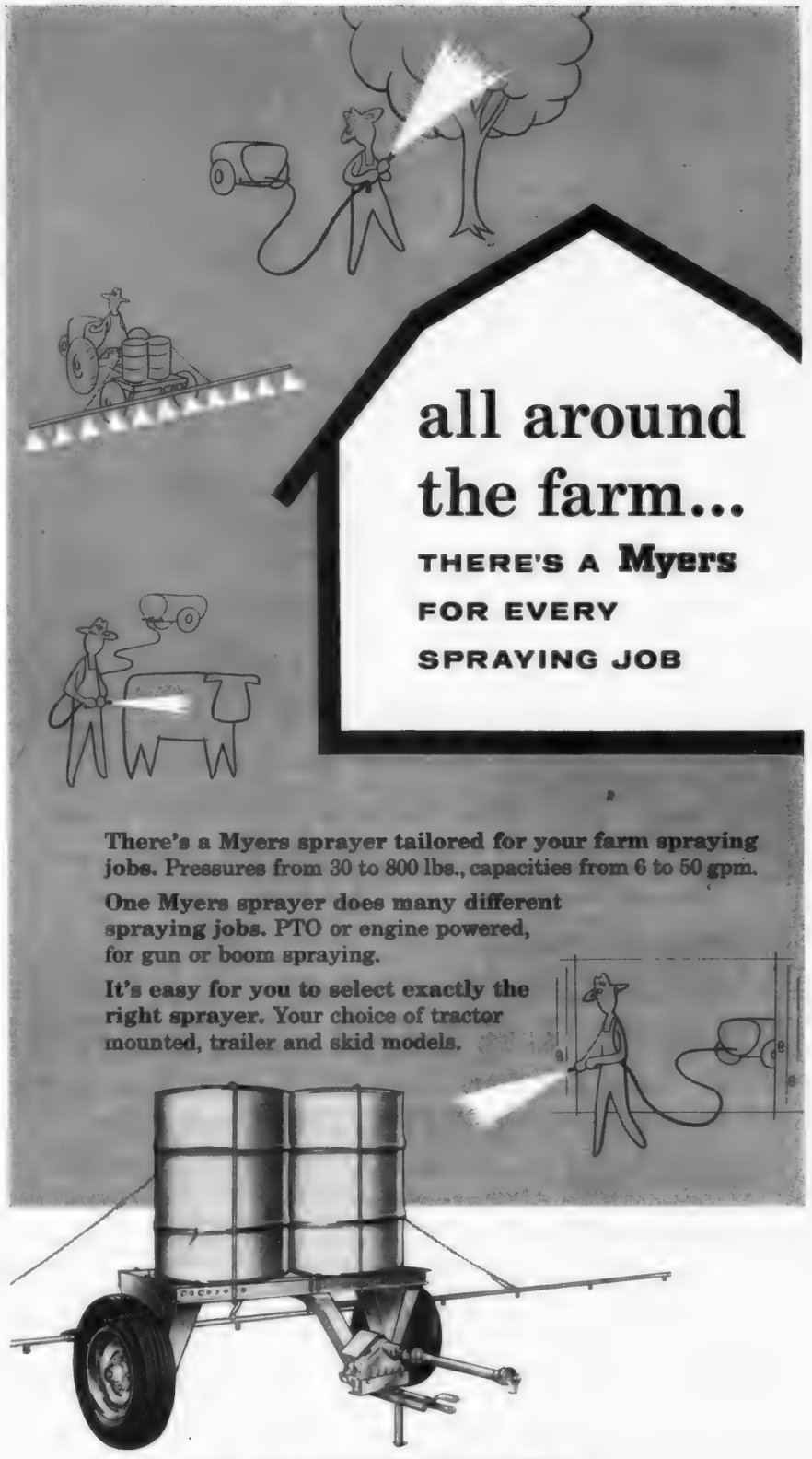
On the twentieth of August planting starts, "even if it's dry as dust." The Cunninghams figure September 1 is the ideal date, but with their large acreage they must start early so they can complete the work not later than the twentieth of September.

Their seed mixture consists of 3 bushels of oats per acre, 30 pounds of rye grass and 10 pounds of either reseeding crimson clover or button clover. "We're heavy on the hand that opens the seed drill," Rutland comments. The oats are for early grazing. The grass and clover are good insurance in case something happens to the oats and they also come on strong in the spring. The crimson clover and rye grass and button clover, once established, do not have to be sown again for several years.

The oats are sown with a drill which also distributes the starter fertilizer. The rye grass and clover are put down with a cultipacker-seeder. The drills are hitched two to a tractor to stay ahead of the cultipacker and with this arrangement the seeding proceeds at a rate of about 50 acres a day and is completed by September 20. By the middle of October the pastures are ready for action and there had better be some livestock around to put them to work. If the oats ever joint they are finished. When they are grazed after that they do not recover. The Cunninghams' complete cost this past year for land preparation, seed and fertilizer ran $27 per acre.

There is a saying among the winter grazing fraternity that "fertilizer is the cheapest feed." The Cunninghams are in complete agreement with this sentiment. "You can't skimp on fertilizers on these southern soils," they warn. "If you can't ante up on the fertilizer you'd better stay out of the game."

Three hundred pounds per acre of 13-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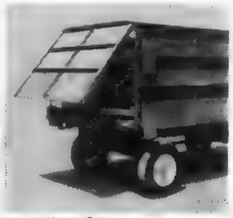

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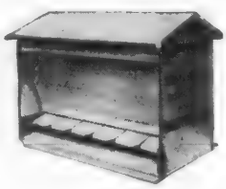

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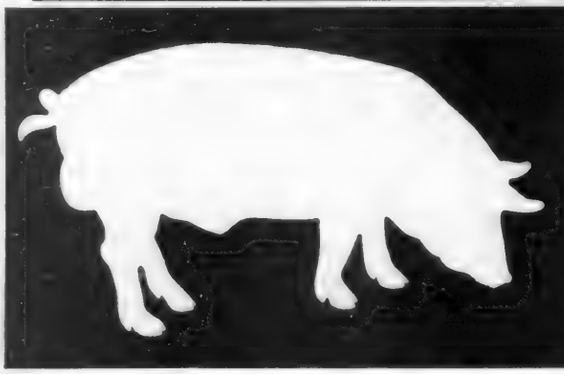

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13-13 are put on at seeding. Another 200 pounds of ammonium nitrate are applied shortly after the seedlings break through the surface; and the field gets another top-dressing of 100 pounds of ammonium nitrate late in February to get the spring growth off to a good start. A rule of thumb says one pound of nitrogen will provide one cow-day of grazing. For calves it should provide grazing for 2½ to 3 days.

Lime is applied as its need is indicated by soil tests. It is disked in at least two months before planting time.

One of the details insisted upon by the Cunninghams is that the phosphorus in their fertilizers be in a water-soluble form. Experiment station tests indicate that phosphorus obtained from materials having 50 to 60 percent water solubility is about twice as effective as that from materials of lower solubility. This is particularly true with oats when the fertilizer is drilled. The advantage seems to be lost when the fertilizer is broadcast and disked in. With drilling there is less mixing with the soil and the fertilizer is in a better position to get the plants off to a fast start. Phosphorus sources high in water solubility include liquid phosphates, ammonium phosphate, and ordinary concentrated superphosphate.

Bring on the Calves

When the pastures are ready for grazing the calves had better be at hand. As was mentioned, if the oats ever joint they are finished. This matter of how fast to buy the calves and get them in, Rutland admits, affords some of the trickiest decisions connected with the program. "Don't ever let the oats get ahead of you," he cautions. "If conditions look good load up a little faster than the grass seems to be coming along and carry the calves on supplemental feed until the pastures hit their peak."

A neighbor of the Cunninghams who operates on a much smaller scale (less than 35 acres) one year borrowed 23 cows to keep his winter pasture in hand.

Fresh calves are essential to the project. Rut, Weakley and Andy Barnett are agreed that underlying their high death losses in past years was their inability to get calves out of first hands. They buy very small animals and the smaller the calf the more possibility of disease and nutritional trouble, particularly with calves which have been shunted around from one market to another for a week or more.

So one of the inflexible Cunningham rules is to buy their calves either direct from the farm or through one of the big central markets where they rely on a reputable buyer to get them stock which has just come in from the farm. The bulk of their purchases are made in the big yards at Montgomery, Alabama.

"We want to get them out of the yards just as quickly as possible," Rut says, "so we move them right away. Then when we get them here we give them a three-way

shot to protect them against black leg, malignant edema, and hemorrhagic septicemia. We've also found that a tranquilizer, we use Diquel, is a big help in getting them settled down. It sure stops that fence walking that's so hard on these young calves just after they've been weaned. Most important of all, we try to get them on clean, fresh pasture just as soon as possible."

Internal parasites are another object of special concern. This is Andy Barnett's pet theme. Andy blames internal parasites as much as anything else for the deaths. So all the calves get a dose of liquid phenothiazine—according to the manufacturer's recommendations—soon after they have become acclimated.

Dehorning is another matter that is attended to after they have settled down.

To expedite all this handling, Weakley, the engineer of the partnership, has designed a series of corrals with a unique central sorting arrangement where one man can control a half dozen gates without ever taking a step. The corrals, of course, are equipped with the chutes, squeeze scales and other equipment necessary for handling and treating any cattle on the place.

Dairy Replacements

After they reach six weeks of age, the heifers raised for the dairy line are handled the same way as the other calves. For the first three days of their lives they have their dams' colostrum. After six weeks on a milk replacer, they are weaned.

Supplemental feed is kept before the calves at all times. When the pasture is good they pay no attention to it; but early in the fall before the grass gets off to a good start or during the course of the winter when the weather sets it back, they may eat as much as five pounds a day.

"Frankly," Rut admits, "we don't know what to feed on pasture. Right now we're giving them a mixture of equal parts of ground, shelled corn and cottonseed hulls or cobs, plus 150 pounds of cottonseed meal and 200 pounds of molasses to the ton, calcium, phosphorus and salt."

At the Georgia Experiment Station they have been very successful in raising calves on pasture, mainly dairy replacements, with no supplemental feeding. If the pasture gets short the calves come through all right and pick up again as the grass improves. But to get that consistent pound and a half a day gain on calves headed for market in the spring, the Cunninghams feel they must take up the slack any time the pastures get a little weak.

All the calves except those to be kept for replacements are sold in the spring. "That's one of the advantages of this program," Rut points out. "We buy these little things in the fall when they are usually glutting the market, and we sell them when everybody is looking for something to run on spring pasture. We begin selling about April 15 and by the first of May we're cleaned out. We carry nothing through the

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The Bonus

After the first of March it is normally impossible to keep the fields stocked heavily enough for the calves to stay ahead of the grass. So the Cunninghams combine some of the oats, put up grass silage and strip a good bit of rye grass seed. Their silage runs from 12 to 15 tons to the acre. This is a bonus which does not appear on the books to the credit of the calf project.

"There is no livestock program south of the Tennessee line that can beat this thing," Weakley says as he sums it up. "It's simply a matter of feeding green concentrates. And you feed to a class of stock which can make the best use of it. After deducting all expenses and our own salaries we are netting $22 to $25 per calf and we are running an average of 2.53 calves per acre. That's $55 to $63 per acre from grazing. Show us something to beat it—if you can."

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HILLY-BROOK PONDS

(*Continued from page* 99)

in sod on the Hilly-Brook farm have practically eliminated erosion, so silting is no threat.

C. M. Luburgh, a contractor who has built farm ponds in the Midwest for years, says that where other methods failed to slow running water to a walk, he builds ponds to protect ponds, small silt collectors. Herrling seeded a strip of bluegrass, 15 feet wide, all around the pond edges to protect the banks against cave-ins. For his 150-foot beach he trucked in 80 tons of sand. He also covered the back side of the dam with sod. He kept trees outside the bluegrass strip and off the dam, too. Rotting leaves spoil pond water, and decaying roots in the dam form passages for seepage. Herrling feeds his cattle entirely on drylot, so he doesn't have to worry about their turning the ponds into a wallow. Cattle grazing near a pond have to be fenced out.

Herrling's background includes a major in agricultural economics at the University of Wisconsin and work for the government's Division of Farm Management and Costs in Washington.

Still, sentiment crops up as often as cents in his conversation. He loves to tell why he bought this particular rundown farm.

"It's all tied to a history of 111 years. In 1849, James Barlow, my great-grandfather, took out the original title to this land. I have a copy of a deed covering part of the grant, which is signed by President James Buchanan's own hand."

For fifty years, title to Hilly-Brook farm was outside Herrling's family, but he kept an eye on it and bought it back.

When the visitors were standing around the trout pond, they noticed ridges in the bluegrass cover above the upper end of the water. These, Herrling explained, were sod waterways that lead runoff away from the natural inlet to the trout pond into the larger pond below. They prevent an excessive inflow after heavy rains and, equally important, they keep the runoff water from warming the trout pond in the summer. The pond is fed by a spring which flows at a uniform 55 degrees.

"Trout can't live in water where the surface temperature gets over 70 degrees for any length of time," Herrling said. "In the summer, the water in the larger pond gets up to 76 degrees at the surface."

Sod waterways can also be used, of course, to direct water to a pond to increase the runoff supply area.

Though Herrling's two-acre pond catches runoff water in heavy rains, most of the water that enters it comes through a pipe from the trout pond. The spring which feeds the trout pond puts out 3,000 gallons an hour, most of which flows right on through and into the larger pond below. The year-round constant temperature of the spring water keeps a section of the larger pond unfrozen, even in the deep freeze of Wisconsin winters. This is a plus, because under thick ice fish often winterkill from suffocation. Herrling's fish get extra oxygen, as the water dropping into their pond is aerated as it splashes on a stone.

The depth of Herrling's two-acre pond also protects the fish from winterkill. It is 6 to 8 feet from the surface to the bottom, on the average, and 12 feet at the deepest spot, so there is an abundance of unfrozen water under the ice.

"When snow falls on the ice, I blade part of it off with the tractor," Herrling added. "Underwater plants growing in the dark take up oxygen instead of giving it off. When the snow is removed, enough light

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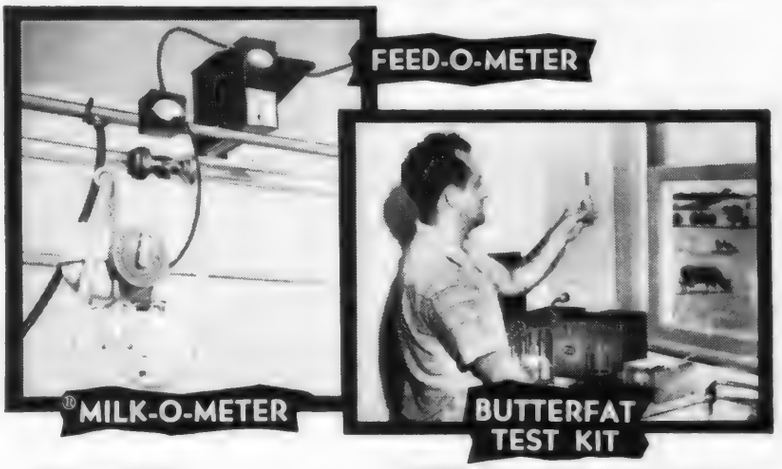

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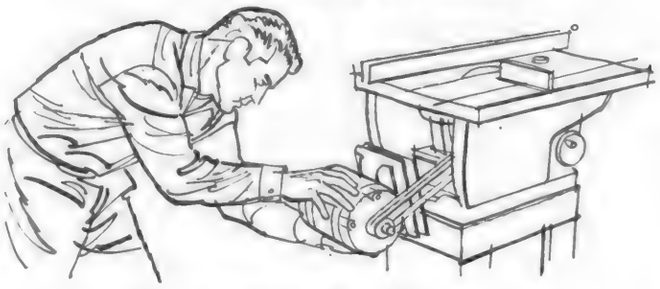

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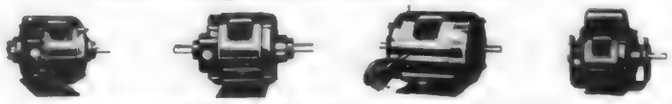

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gets through the ice to keep the plants growing. Of course, the smooth ice also makes fine skating for Greg and Mark, my boys."

This summer Herrling will complete stocking the two-acre pond. This job began in July 1959. The 500 largemouth bass he put in then came free from the U.S. Fish and Wildlife Service.

"I've heard some people say since, that about 200 bass is the rate generally recommended for stocking a two-acre pond," Herrling said. "But I'll probably come out all right, because some of the small fish washed through the exit pipe."

Last December Herrling noticed that he was losing bass from the pond when he saw some in a pool that had formed below the outlet pipe. He put a fine wire screen around the edge of the pipe to keep from losing more fish. However, the accident gave him a check on the progress of the fish in the middle of the winter. They had grown to seven inches. At stocking time they were only an inch and a half.

This spring the bass grew till they reached a weight of about one-half pound, Herrling estimated. He plans to stock bluegills with the bass since bluegills are first-rate bass food. The general rule is to stock 10 bluegills for every bass. Herrling ordered 2,000 bluegill fingerlings for June 1960. This number will give him the textbook approved 10 to 1 proportion of bluegills to bass, if his bass are down to 100 per acre by that time.

"If there are a few more bass left than that, I wouldn't be particularly worried," Herrling remarked. "I'd rather have the bass get ahead of the bluegills than vice versa. Anyway, the stocking rate is no cut and dried matter, you know."

Many fishermen contend that the general rule for stocking may not be best for all locations. In Ohio, pond builder Luburgh stocked only about one bluegill in his pond for every five bass. The idea is to keep bluegill numbers down to a level where just enough bluegill fingerlings are hatched to keep the bass bellies full.

Clifford Brynildson and Arthur Ensign of the Wisconsin Conservation Department inspected the Hilly-Brook ponds to approve the order for federal fish. Brynildson is among several northern biologists who believe that in the north, bluegills might best be left out of a planned pond population. This avoids overcrowding by bluegills. "Bass can still grow to fair size," he said, "by feeding on minute aquatic animals, and the minnows and bluegills that naturally come into a pond."

Fish Poison

E. B. Howard of Zanesville, Ohio, feels that the bluegills in his bass pond are getting the upper hand. "Every year now the bass and the bluegills we fish out are getting smaller," he says. "That's a sure sign of overpopulation. Hungry fish don't die; they just quit growing. I'll have a state biologist come up this summer to kill off some of the bluegills." The biologist will put rotenone in the shallow upper end of the pond where the bluegills congregate.

If balancing the fish population has been neglected for years, conservationists recommend killing off the fish entirely, and then restocking. A good method of spreading rotenone for total kill is to drag a quantity in a burlap bag behind a moving boat. The rotenone dissolves through the bag into the water.

The fish poison paralyzes the gill action of the fish. It cannot hurt livestock or humans; in fact, the Indians used to catch fish in this manner. Rotenone settles out of the water in about two weeks. Then it's again quite safe for fish, and conservationists advise restocking immediately, before undesired types of fish sneak in and take over the pond.

Rotenone costs 45 cents per pound. Conservationists suggest spreading three to five pounds of it per acre-foot of water for a complete kill. This rate is for rotenone in 5 percent strength, such as fresh derris or cube (pronounced "kubay"). To find the number of acre-feet in a pond, multiply the surface acreage by the average pond depth. It's easy to take measurements in winter, where there is an ice cover, by marking off convenient sections on the ice and taking depth soundings at regular intervals.

This fall Herrling will test the complete stocking operation by seining along the shallow shoreline, especially near indentations. A few passes with a minnow seine will show whether there are both bass and bluegill young in the pond. If so, both species of fish spawned successfully, the sign of a good start for pond fishing.

After that, the best way to keep the pond in balance will be to fish it as hard as possible.

"I doubt that I can keep the fish numbers down just by fishing for my own family," Herrling predicted. "I'll bring in friends to help me take out about half the fish in the pond each year to make enough room for more fish that can grow to good size."

As a warm water pond owner he welcomes herons and other birds that help with the fishing. His welcome was reserved at first because herons didn't restrict themselves to bass and bluegill dinners, but ate trout with equal gusto. Trout don't reproduce in ponds, so every trout casualty needs a replacement that has to be paid for. In the end, however, he turned thumbs up for the beaked competition.

"I like these birds," he explained. "I'm sure they will make up for mischief in the trout pond by keeping the bass and bluegills under control."

Herrling does not fertilize his ponds. Although the fish crop goes up sharply with good fertilization in southern states, in Wisconsin fertilizing boomerangs by starting a thick mat of algae, known as duckweed or pondscum. This mess has to be raked off with a wire clothesline or a short section of fence wire. If it grows undisturbed, it ruins good fishing, makes swimming unpleasant, and sometimes poisons the water for horses, cattle, and poultry. The poisonous algae are among those named "blue-greens"; naturalists classify the real culprit under the genus *Anacystis*.

To Herrling and other fishpond owners, not only algae, but all green growth that's visible to the eye is weeds. Little fish hide among plants, and cause big fish to lose their dinners. Mosquitoes also escape the fish and live unmolested among pondweeds. Weeds that start growing along the shoreline are pulled out by hand. Herrling stops chokeweeds that start at his pond edge that way. Pondweeds with leaves and flowers that float on the water can be held in check by cutting them below the surface.

"Shallow water is the basic cause for weed trouble," contractor Luburgh said. He digs pond banks as steep as one foot of slope for every foot-and-a-half of horizontal distance from the top of the

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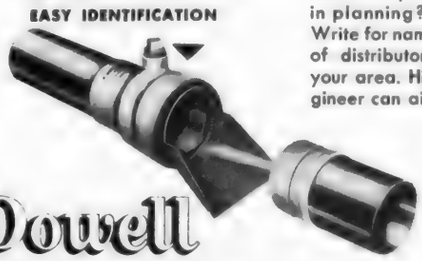

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John Habeck, one of our field service men, is typical of the present generation of Niagara people. He's field service manager at Red Hook, N. Y., heart of the Hudson River Valley fruit belt—where principally apples, some pears, grapes, cherries, small fruit are grown.

Niagara's John Habeck and Grower Johnny Feller, Red Hook, N. Y.

John's job: planning orchard pest control programs for about 120 growers that he and his assistant, Don Coons, cover. Although his headquarters is Niagara's Red Hook warehouse, John's real office is in the field with his customers.

Long before the spring's first spray is needed, he's at work on the coming season's program for each grower. He and Don call on several growers each day, depending on the size of the operation, variety of crops, number of problems.

Prime tools for these sessions are the file John keeps on each grower plus the grower's spray record book. His file, carried in his car and filled with notes after each inspection, pinpoints problems. Comparing these notes with the spray record book—the value of which John preaches with missionary zeal—shows where they may have gone wrong . . . how they can do better. The result is an individual program designed for each grower's crops, location, equipment, soil.

Spring starts the regular rounds of orchard inspections. Always abreast of weather and insect conditions in the whole valley, John recommends adjustments in programs, as necessary, during the growing season. And his file is filled for better control in the future.

Ask John when he takes a vacation, and he'll tell you about his home in nearby Rhinebeck and how he, his wife, two daughters and son enjoy their 80-acre farm.

It includes a shooting preserve where he trains German shorthaired pointers. When things get slow in fall and winter, he takes a "darn good dog and shoots a few birds." That's the kind of vacation he likes . . . and it lets him stick close by in case his growers need him.

Except for a two-year management training program following duty as a Navy pilot in World War II, John hasn't strayed far from the Hudson Valley orchards he's known since boyhood. Now in his thirteenth year with Niagara, he's "Uncle John" to most of the growers' kids . . . a welcomed friend to their dads . . . and a proud advisor (John says, "I feel like a coach") to young ribbon-winning growers.

Naturally concerned about the fruit industry, he feels the main apple problem is "economics—growers must work out marketing plans to get the price they need." As for insects, he dubs mites the number one problem—"but with the new miticide, Tedion®, we'll lick it."

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bank, till he reaches a depth at least four feet under the water level. "With a pond dug this way, there isn't a bit of weed trouble," Luburgh maintained. On ponds such as Burk Settles' pond near Nashport, Ohio, where shallows caused weed trouble, Luburgh reshapes the banks and bottoms with a dragline. He doesn't have to drain any water from the pond to do so. His 22-ton dredge reaches 60 feet into the water. which is far enough to deepen and reshape a pond up to two acres in size.

Especially on large ponds, the last resort against an overgrowth of pondweeds is to use weed poisons. For algae, the chemical to use is copper sulfate, which should be put on as soon as algae start developing in the spring. To treat a two-acre pond with an average depth of five feet costs about $2.60 for the chemical. The same size pond treated against rooted weeds requires about $16 worth of another chemical, sodium arsenite. The active ingredient in sodium arsenite is arsenic, a deadly poison to man, animals, and shore plants, although it doesn't harm fish. It corrodes ordinary spray equipment, so for arsenic treatments and for copper sulfate spraying, too, it's best to hire a professional contractor.

Safer chemicals for killing water weeds are now coming onto the market. Kuron, a spray like 2,4-D, kills cattails and other water-rooted weeds effectively. One application keeps weeds down as long as two years. To cover a two-acre pond five feet deep costs $125 to $150 for the chemical

alone. While Kuron is low in toxicity, it is not now recommended for treating pond water used for drinking or crop watering, according to the manufacturer, the Dow Chemical Co.

Granules of 2,4-D are new and handy for use on floating weeds, such as lilies. It costs $66 to treat a two-acre pond, but the granules need to be spread only where weeds are actually growing.

More new chemicals are just around the corner, and with increased use, their cost will go down. However, the best, long-lasting protection against trouble is to build the pond with established engineering principles in mind.

Some of the bonuses that go with a pond are as valuable as the more obvious benefits. Herrling timed the volunteer fire department at 12 minutes in laying a line from his pond and stand ready to fight an imaginary house fire in a recent drill. This time included a 4½-mile trip from the firehouse at Cross Plains. "With almost unlimited water nearby, insurance companies can give you lower rates for fire coverage," Herrling added.

Herrling sees water for his cattle as another pond bonus, even though he doesn't need it now. However, Herrling has a system ready to pipe pond water to a trough if he should ever want to water his cattle in the pasture.

His plans for the ponds include a project that will bring in hard cash. He plans to select among walleyes, pike, or crappies for his new pond, and he will raise minnows for bait in the waterway between the two larger ponds. With the bass, bluegills and trout already stocked, he'll have a variety to attract paying fishermen.

He also has put his land into a shooting preserve. When the pay fishing opens, he plans to sell hunting rights, too, as a sportsman's package. He has already taken out two yearly licenses at $5 each, required by the state for pay fishing and operating a shooting preserve.

"I'm thinking of generating electricity with water from the exit pipe, to light up the beach," Herrling said. "It won't save much, but it's fun, and goes to show you that the only limit to what you can do with a set-up like this is time and your imagination."

THE AUTHOR: Max B. Heppner, a free-lance writer for farm publications, has farmed in Holland and Israel, as well as in his home state of Ohio. He studied farm management at Ohio State University, has a Master's degree from the University of Wisconsin in agricultural journalism.

THE FARM'S PICTURES

Cover by J. C. Allen and Son

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★ KEEPS COWS OUT • SAVES FEED
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★ HEAVIER WEANING WEIGHT ★ MORE PROFIT

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DEADLIEST Fly Killer Yet Discovered!

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Silo filling is a one-man job with the Cobey 51-BF.

HANDLE UP TO 60 TONS OF SILAGE PER HOUR—
SAVE $800 OR MORE PER SEASON IN HIRED LABOR!
—With Cobey 51-BF Self-unloading Forage and Bunk-Feeder Wagons

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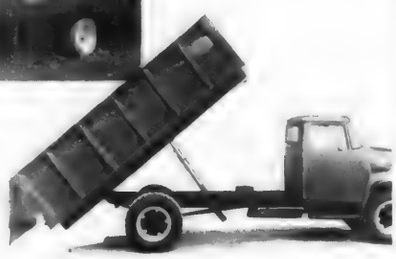
If bunk feeding green forage or ensilage is not a factor in your plans for barnyard automation, the Cobey 51-B will give you the same multi-purpose, the same saving in labor, time, and cash in silo filling, as does the Cobey 51-BF described above. And since the bunk-feeder attachment is not a part of the 51-B, the cost of the wagon, naturally, is less.

The Cobey 51-B is a straight self-unloading Forage Wagon.

ONE MAN CAN UNLOAD IN MINUTES WHAT 3 MEN WOULD TAKE HOURS TO SCOOP!



A Cobey Hydraulic Hoist mounted on your truck will easily repay its cost within a year—in the time it saves and the hired help it eliminates. And Cobey Hoists are custom engineered especially for farm service. Based on 40 years of hoist know-how, Cobey packs more performance, service life, and freedom from maintenance in its hoists than any other hoist made.

Here's the fine shredding, wide spreading you get with Cobey P-T-O Spreaders!

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WITH THE LARGER CAPACITY OF COBEY'S P-T-O SPREADERS!
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WRITE TODAY FOR FULL INFORMATION ON THESE COBEY PROFIT-MAKERS!
THE COBEY CORPORATION, Galion, Ohio

NEW TESTS AT NEBRASKA

(*Continued from page* 96)

not figures which should interest the farmer. They are not likely to be usable under normal conditions. The farmer should be interested in the horsepower available at the standard pto speed and the average fuel consumption in the drawbar tests and in the performance of the tractor without ballast, and in the lugging test. These will give an idea how the tractor will behave in the field.

"In the early reports there were many faults and breakdowns reported, and the opinion became common that the early test was devised solely to point out weaknesses. This is emphatically not true," said Professor Hurlbut. "The tests were to help improve the design of tractors, and farmers and manufacturers should both be interested in this objective.

"There is, in fact, a feature in the law which allows the manufacturer to withdraw the tractor from test and improve its performance, if he feels it is not performing as well as it should. (This is only true if the manufacturer has not begun to sell the tractor in Nebraska under a temporary permit.) This happened as recently as last year with a foreign tractor manufacturer.

"I believe it would be ideal if, in the future, all the testing stations should come to have the same testing procedure. Right now Italy and Nebraska work under the same code, and a new testing station is being set up in the Union of South Africa under the direction of a recent Nebraska graduate. Russia, England, Denmark, Holland, France, Germany and Australia also have testing stations with various standards.

"In 1959 an agricultural tractor test code was adopted by the Society of Automotive Engineers and the American Society of Agricultural Engineers, with the hope that this will be gradually developed into an international code. The changes to our test code, four in all, have been mainly in the interest of the farmer. The Nebraska Board and tractor test engineers helped to write the new code. We were particularly interested in having a fair means of assessing the new types of transmissions.

"Although the Nebraska law is enforceable only in the state of Nebraska, its reputation is worldwide. The results are seldom challenged. The Nebraska law requires a manufacturer to publish the whole test if he uses any part of it. This, of course, is to prevent him from picking out certain good features of his tractor.

Manufacturers' Choice

"A great deal of responsibility is put on the manufacturers," continued Professor Hurlbut. "They have to select a stock tractor to represent them at Nebraska. They conceivably could select one 'best' tractor built to such fine tolerances that its performance would be completely unrepresentative of the model as sold. But I believe the manufacturers don't select such an outstanding tractor They try to pick one which is representative of the product whicl goes on the market. Any stock model tractor would probably need some adjustment before it came exactly to the standard of the tractor tested at Nebraska, but it does have that potential.

"Our engineers are careful to regulate or record all other conditions which might have an effect on the performance of the tractor. For instance, the weather. A low barometer would make for a lower horsepower. Also, a high temperature would make the horsepower lower. So we record the temperature and barometer readings for each phase of the test. Of course, a farmer can't change the air temperature and pressure on his farm, but at least he does know what the conditions were when we made the test on this tractor. Another thing which we found affecting the drawbar pull was tire wear. As a tire became worn we found it gave better grip on our concrete test course and so more drawbar pull. Because of that we won't test a tractor which has tires worn under 65 per cent of their original bar height.

"Crawler tractors, of course, are tested on our earth course. We take great trouble to make sure this course is in the same condition for every test.

"Not only in these tests, but in normal tractor operations from day to day, there are many variables which can change the performance of a tractor—the temperature, the barometer reading, the humidity, many of the factors about the tractor itself, like the

engine temperature and the age of the tractor, can alter the horsepower considerably. For instance, tire pressure has an important effect on drawbar pull. On the concrete course on a hot day, the temperature in the tire rises, increasing tire pressure. The tire pressure is checked frequently. It can affect drawbar pull. Our testers try to reduce the variables as much as possible, so they are not important to a farmer who is operating a tractor on a day-to-day basis.

"These tests are a good source of information on new developments in tractors," Professor Hurlbut continued. "When there was a change from steel wheels to pneumatic tires, the Nebraska tests showed what each would do. When new fuels appeared, such as liquid petroleum gas and diesel fuel, the tests gave information on the use and performance of the new fuels. We intend to provide a buyer with data to make his own appraisals for his own conditions of the tractor that interests him.

Changes in the Test

"I don't think we are likely to make important changes in the test. There is just a possibility we might reduce the limits on wheel slip from 15 percent to 10 or 12 percent because we have received some criticism that drawbar pull figures vary when the slip is high. These would not be important differences, but 50 to 100 pounds variation is enough to arouse our critics. Perhaps, too, we might change the 'minimum' load in the varying power and fuel consumption test to 'no' load to show the idling speed of the tractor.

"We believe the tests serve their purpose," said Professor Hurlbut. "We will begin Test Number 733 sometime this March, and we already have an almost complete schedule for 1960. Strangely enough we had an application from John Deere today for tests on a new tractor, and it's almost exactly 40 years since we did the first test on their Waterloo Boy."

Aluminum Paint Reflects Heat, Keeps Buildings Cooler

Poultry and livestock production goes up when shelters are cooler—and the easy way is to coat roofs and buildings with aluminum paint. Aluminum paint reflects heat, protects against rust and deterioration. Write for names of leading paint manufacturers:

Reynolds Metals Company, Richmond 18, Virginia.

The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

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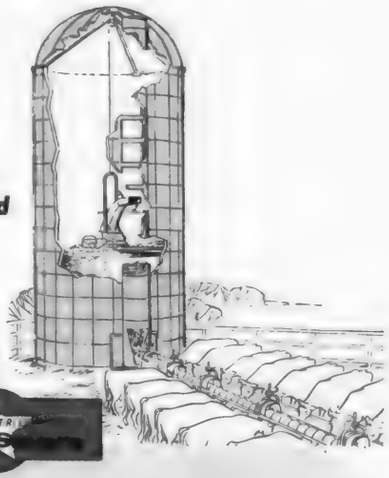
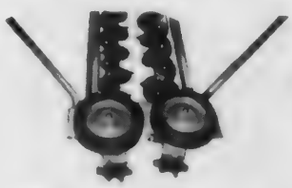
in this matched feeding team work efficiently, economically, and trouble-free year 'round



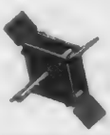
SINCE 1883 STARLINE HARVARD ILLINOIS ELECTRIC Silo Unloaders

UNLOADER

TWO DRIVES— Constant rotation is assured by two drive drums working on opposite sides of the collector arm.



TWO AUGERS — Twice the cutting edges of single auger unloaders . . . break up frozen silage better, deliver a more even flow to the impeller, faster.



ROTARY IMPELLER — Four paddle arms throw down a constant stream of silage. Impellers throw more silage than blowers and move it with less horsepower. Impeller blades are hardened for longer life.

ONE HEAVY-DUTY MOTOR — Powers the whole unit — drive drums, dual augers, and impeller — through toughest silage for about 5c per day. Protected against burn-out from electrical or mechanical overloads.

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SHIELDED BEARINGS SAVE FEED

10" wide stanchions, which support the side boards, also serve as shields over the oilite bearings to keep light feeds from being thrown out and wasted. Two augers may be connected in a T or L arrangement.

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Starline "S" augers have additional flat tapered lead-in flighting which produces a continuous flow of material from one auger section to the next . . . motors are reversible to deliver feed in either direction.

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Now Available—3,000 lbs. LIVESTOCK SCALE

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SURE-WEIGH Model 500 comes complete for easy, perfect installation. 1/10 of 1% accuracy. Fits into any existing stock handling equipment. Read weight from normal standing position. Also complete fully mobile and semi-portable models. Clip ad now and mail for all the details.

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$225.68
(less auger)
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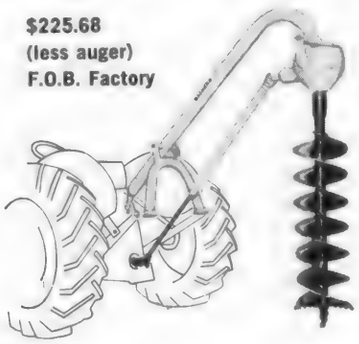
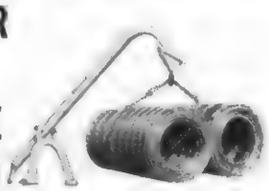


DANUSER 3-POINT HITCH DIGGER AND CRANE BOOM!



A **NEW** 3-point hitch Digger that lets you **DIG DEEPER** HOLES SITTING DOWN... as deep as 62" with many tractors!

Digs straight holes in any terrain. Auger sizes 4" to 24" with replaceable cutting edges and point. 7" and 14" extensions available.

It's convertible too! Pull **ONE** pin... add a HOOK... it becomes a CRANE BOOM with hundreds of uses... lifting and carrying heavy loads, etc.

Adapter Kits available for Tractors not equipped with 3-point hitches. Write today for complete information!

DANUSER MACHINE COMPANY

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"Contributing to Farm Mechanization"

FERTILIZER PLACEMENT

(*Continued from page* 89)

the Michigan State University Soils Department and now with the National Plant Food Institute as regional agronomist working out of East Lansing, Michigan, was checking some other angles in a study in the University greenhouse. From studying seedings in small trays there, he determined, for one thing, that fertilizer damage was more serious to poor quality than to high quality seed. He also learned that, contrary to widespread belief in research circles, phosphorus was just as important as nitrogen or potash in causing crop damage where complete fertilizers were applied. The danger point, he determined, where nutrients in contact with wheat seed would cause serious damage to germinating seed, was in applications of more than 100 pounds of nutrients per acre. He also strengthened the belief that the drier the soil the more likely the seeding is to suffer fertilizer damage, and that oats and barley tolerate higher applications of nutrients than wheat before there is serious damage to germination.

And, perhaps most significant of all, Dr. Guttay learned that wheat fertilized by placing the nutrients an inch below the seed and an inch to one side, germinated and emerged at the same rate as the unfertilized wheat.

Test results from the big USDA precision drill brought out similar results. Here then was the answer; you could fertilize wheat heavily, and presumably increase your income, as long as fertilizer and seed were one and a half to two inches apart.

The difficulty comes in finding or fixing a machine to accomplish this. Some wheat growers have had such drills especially made by manufacturers. At least one bought an old grain drill, filled the fertilizer hoppers, hooked it behind his other drill which carried only seed and pulled them in tandem. The distance of the fertilizer from the seed varied, of course, but for the most part they were separated, and the idea worked.

What are the ill-effects of a poor job of fertilizer placement? There can be at least two. Unless fertilizers are placed properly the growing plant can't make maximum use of the nutrients. This cuts returns from application of plant food. Then if they're in contact with seed, fertilizers can damage germination. It's this reduced germination that is most obvious. It shows up plainly enough in poor stands of corn, soybeans, small grains and others crops. But you still can't automatically blame poor stands on fertilizer placement and be right.

Nitrogen and potash compounds used in fertilizers are salts. They're quite soluble in water and once they've gone into solution in the soil they move up and down

Genuine Pfister

P-A-G

PFISTER ASSOCIATED GROWERS, INC.

THE MOST FAMOUS NAME IN CORN

TRY THIS NEW HYBRID FORAGE GRASS

PRODUCE MORE TONS OF LIVESTOCK FEED PER ACRE

- ★ High feed value, palatable and nutritious
- ★ Up to 14% protein, 150,000 Units of Vitamin A
- ★ Good sugar content, all livestock like it
- ★ Growers report cheap beef gains, high milk production
- ★ No bloat reports after 3 years of grazing
- ★ Perennial type plant, easy to grow, drouth resistant

Growers say—"Best forage crop we've ever tried, beats anything!"

This new *high-production strain* of Sorghum Almum Grass was introduced from Australia just a few years ago. In the last two years, stockmen in every part of the nation have tried it with outstanding success. Plantings on both irrigated and dry land show high production on many different types of soils, from clay to blow sand, under a wide variety of growing conditions.

Grows from 5 to 14 feet tall. Leaves are broad, shiny-green, rich in vitamins. At proper cutting time, stalks are succulent, tender and sweet. Makes an ideal forage that all livestock like. Yields heavy tonnage — up to 30 tons or more of ensilage, 8 to 12 tons of hay per acre are reported.

Hundreds of enthusiastic letters from Florida to Oregon, New York to California say—"Everything you said it was," "It's the coming hay in our part of the country," "Beats anything we've ever tried," "Best pasture I've ever seen," "Increased both our milk production and cream test," "Cattle go for it like kids eat candy."

"Most promising new crop to reach the U.S. since alfalfa,"

Find out for yourself how this new forage grass can fit into your livestock program on your own farm or ranch. Takes only 1½ to 4 lbs. of seed per acre, produces tons of feed. Many reports of good crops "where nothing else would grow." Don't delay, order your seed now!

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Special 5-Acre Test Offer, with Grower's Bulletin (10 lbs.) Postpaid in U. S.....$12.95

Stockman's 12-Acre Grazing Test, with Grower's Bulletin (25 lbs.), Postpaid.....$29.95

(Prices slightly higher in the East)

NEW MEXICO *Seed* FARMS
P.O. Box 1011 – Clovis, New Mexico

depending on water movement. Vertical movement of soil solutions is much more rapid than lateral movement.

Phosphorus compounds are less soluble, and they don't move about in the soil as much as nitrogen and potash. It takes water for the plant nutrient compounds to change into salts. The nitrogen and potash especially draw this water from the soil. When large amounts of salts dissolve in the soil they draw water from the soil and rob the seedling. In fact, the salts may actually draw moisture out of the seed and dry it up just as surely as an oven would dehydrate it. Serious fertilizer burn kills the seed. Even with lower concentrations of salts in the soil, the plants, while they may live, may not get enough water to prosper.

The most severe damage at this stage comes from a combination of fertilizer in contact with the soil and a shortage of soil moisture. In wet years the salt solutions are spread out so much that crop damage is usually slight, if any.

Separated Band Seeding

Researchers know now that regardless of the field crop being seeded, the best way to put down fertilizer, either solid or liquid, is to drop it in bands separated from the seed. You don't get enough fertilizer money back by broadcasting, unless you're building up the overall fertility level of the field. S. E. Younts, in one such test at Cornell, recently broadcast 20 pounds of potash per acre on a corn test plot in low fertility soil and put the same amount down banded on another plot. The banded plot yielded 7.6 bushels more than the broadcast.

Banding the fertilizer concentrates it in one area and this is good. Here, in solution, the band occupies only a small part of the root zone. And while the salts are away from the germinating seed they're in a location where the spreading rootlets will reach them. The band becomes a feed bunk for the plants. This nutrient band also makes an excellent place to add other elements that you may want to apply, including various minor elements. It's true that there is a highly concentrated salt solution within the band. But the roots develop properly because only a part of them reach the band. Not all of a plant's roots need be up to the trough to feed the plant. The plant can take a disproportionate part of its total nutrients through a single root. Within the fertilizer band the rootlets will often grow and spread out like willow roots in a drain tile and thus get maximum benefits from the fertilizer.

One other method of keeping the plant nutrients concentrated in these bands is by using pelleted fertilizers. Fertilizer compounds in these larger particles take more time to go into solution and the salt solutions are kept more localized, handy to the roots but not touching the seed.

It doesn't make much difference in what form you buy fertilizer—liquid, gas or solid—it changes into the same form shortly after it gets into the soil. It goes into solu-

Compare them all... you'll pick the PAPEC NO. 32P FORAGE HARVESTER

Check the price of a Papec No. 32P Forage Harvester — you'll find it reasonable, yet Papec has the capacity to outperform many more expensive machines.

Check its simple design and rugged construction with a minimum of moving parts — you'll see why Papec gives more years of dependable service with less maintenance and less upkeep.

Check Papec's long list of features — you'll agree that it offers you much more for your money than any other forage harvester.

Check Papec performance with users in your area—you'll find convincing proof in their experiences that Papec is the forage harvester for you.

Corn harvest with Papec 32P Forage Harvester and Papec Self-Unloader — a money and labor-saving combination that can't be equalled.

Yes, compare the Papec 32P Forage Harvesters with all the rest. You'll find it's your very best buy from any and every standpoint.

It will help you produce more milk — more meat — more profit per acre, by getting your harvesting done faster at the exact time that crops contain the maximum amounts of digestible nutrients. It's ideal for either green feeding or silage. In addition, it does many other important jobs such as chopping standing cornstalks for mulch, blowing back spoiled hay or straw on the land for mulch and cutting and chopping straw and cornstalks for bedding.

4 QUICK-HITCH ATTACHMENTS

Direct cut, hay pick-up, and one and two-row attachments are available for your Papec Forage Harvester. One man can quickly make changeovers.

Papec Model 32F has finger feed roll — the 32P, paddle feed roll. Otherwise, these two great forage harvesters are the same in every respect with capacities of up to 5 tons of dry hay, or 25 tons of silage per hour. See them at your Papec dealer soon. Or use the coupon below for information about these and other Papec units for complete feed and forage handling systems.

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BEST in FEED and FORAGE EQUIPMENT

PAPEC MACHINE COMPANY,
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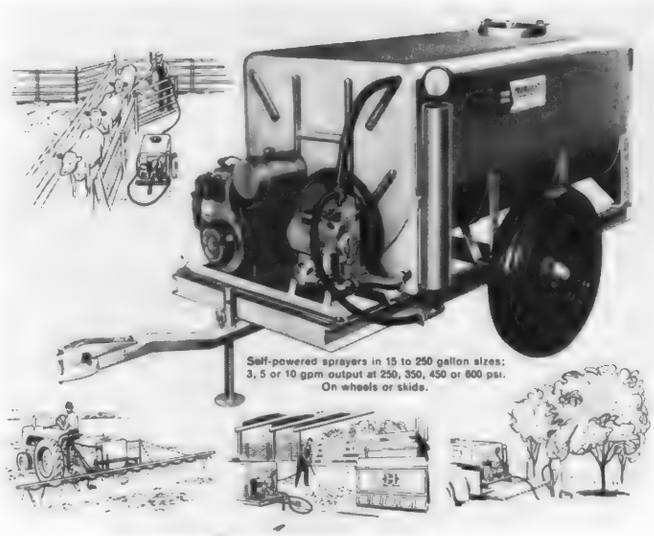

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tion and in that form is picked up by the plant roots.

There is a relationship between fertilizer placement and soil type. The soils that tend to dry out fastest, the sandy ones, are most likely to be the fields where fertilizers cause damage to germinating plants. Soils that hold more moisture give the fertilizer compounds a chance to spread out.

Corn

Placement of fertilizer on corn is not the problem it once was. Machinery has changed. You can now get planters that can be easily adjusted to drop fertilizer one inch below and two inches to one side of the seed, which is where it should go. Agronomists say this spacing is practical and is satisfactory in the field. It puts the fertilizer close enough to be available to the spreading root system, yet far enough to prevent damage to the germinating seed. And it is feasible for machinery manufacturers to turn out machinery capable of this spacing. Recent findings have discredited, probably for all time, the old style split boot which drops a band of fertilizer on each side of the seed. A single band of fertilizer, say the researchers, works just as well as a double band, usually better.

In one Minnesota check, researchers put down 200 pounds of 5-20-20 with a corn seeding by using a split boot and increased yields 6.8 bushels per acre. But the same treatment in a single band two inches below the seed and two and a half inches to the side increased yields by 10.7 bushels per acre.

If you're still pulling a split boot type planter across your corn fields this might be a good time to price one of the newer models, that puts fertilizer down in a single band. Given a dry year or a slight mechanical difficulty you just might save a crop.

Starter fertilizer for corn should be high in phosphorus which stimulates early growth. Nitrogen in the starter will increase the plant intake of phosphorus.

Exact needs of the corn on the individual fields are best determined with soil tests. Michigan soils researchers say that where the tests call for more fertilizer than can safely be applied as a starter on a certain soil you should plow down the extra. And once it's plowed under, the soil is best left loose and undisturbed.

Soybeans

Many soybean growers aren't troubled with fertilizer placement problems for the simple reason that they don't fertilize beans. That's one way of getting around a problem. But the real reason usually given for not using fertilizer on soybeans, or at least much of it, is the belief that they don't respond to the treatment.

The fact is, however, that soybeans could make good use of fertilizer, sometimes as much as 400 pounds per acre.

But soybeans are easily damaged by fertilizer in contact with the seed. Here again the answer is banding the fertilizer. It should be put down an inch below and an inch and a half to one side. If you don't have machinery for side banding fertilizer on beans, it should be plowed down or drilled deeply just before planting.

Many bean growers aim to fertilize the rotation instead of the individual bean crop. They try to put enough plant food on other crops in the rotation to leave enough over to feed the beans. This is good theory but it seldom gives beans that early boost.

Legumes

Few people these days question the fact that band seeding is the best way to plant the small seeded legumes, clovers and alfalfas. These crops need fertilization at seeding time. The fertilizer should be banded under at least an inch of soil and the seed should fall directly on top of the soil. A packer wheel pressing the seed down will provide the only covering it needs. This method, say the Michigan soils people, works on all types of soils.

On the subject of pastures, it is worth mentioning that grasses usually need more nitrogen than is safe to supply at seeding time. Frequent topdressing is best.

Small Grains

These crops, already well discussed here, offer one of the major challenges to those working on fertilizer placement problems to-

day. Small grain drills have not kept pace with advancing knowledge in crop management in this field. Heavier fertilization increases yields here, but most machinery companies still turn out drills that drop seed and fertilizer together. These seldom cause damage to germinating crops when you fertilize at medium rates but they can cause serious damage at heavier rates, especially in dry years.

Sorghum

This crop has fertilizer needs similar to those of corn. But it is planted later when the ground may be drier. Sorghum also has a shorter growing season than corn in which to use fertilizer. Thus the need for starter fertilizer may be more important than with corn. If fertilizer is put down in contact with the seed the nitrogen and potash in it should not total more than 10 pounds of nutrients per acre. Even the agronomists haven't come up with exact figures on fertilizer placement for sorghum, but they do point out that seed and fertilizer should be separated for surest results. If the soil and crop need more, it should be drilled ahead of planting or plowed down.

Sugar Beets

Fertilizer should be banded at seeding time, one to two inches below, and an inch to an inch and a half to the side. If the total application of nitrogen and potash in the fertilizer exceeds 60 pounds per acre, however, the fertilizer should be placed two inches to the side and not below the seed.

Cotton and Tobacco

Cotton is highly sensitive to fertilizer burn. Fertilizer should be banded two and a half inches below, and two and a half inches to the side of the seed.

You can safely apply up to 800 pounds of fertilizer per acre to tobacco at transplant time by putting it in two bands seven inches apart and about an inch and a half below the root crown, which will put it at depths of about five inches below the surface.

With all field crops the increasingly heavy use of fertilizers is certain to make fertilizer placement a more critical problem in the future than it has been in the past. We've entered an age of precision fertilization.

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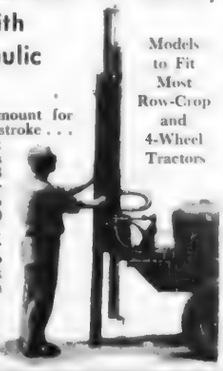

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Another dairyman, James Bagwell of Alpharetta, Ga. says, "After we started feeding the grass, we began having an increase from 180-185 to over 200 gallons a day and I feel that this is remarkable because we have had terrible weather, either freezing, raining, or both when we could have expected to lose a lot in production. I told you that I wanted to buy another and it is a great pleasure to tell you that I am now in a position to make that purchase. Please enter my order for another 120 tray unit."

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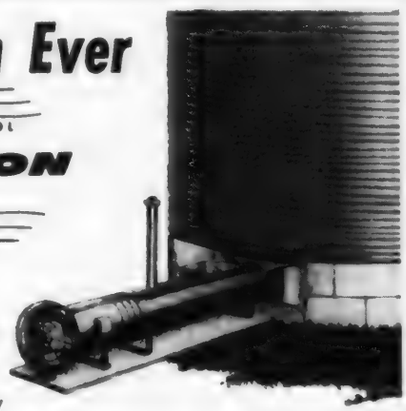

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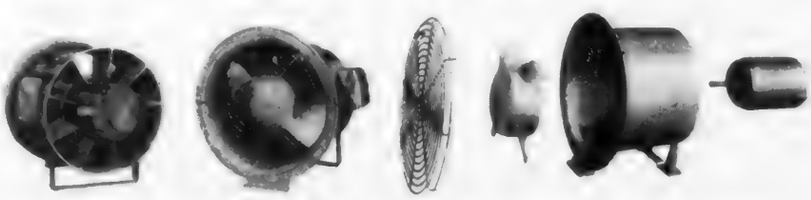

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TOTE BOXES

(*Continued from page* 66)

per bushel capacity for the tote boxes.

Roger and Horace Smith of Pateros, Washington, are among the many apple growers in Washington state who have turned to this new method of harvesting. Their experience represents the practical application of the findings of Washington State University and the USDA.

"Last year, perhaps earlier," Roger Smith commented, "we could foresee the necessity of developing a new kind of picking container. For one thing, our customers wanted apples shipped in fiberboard cartons, not wooden boxes.

"Faced with the inevitable, we undertook a study of all available containers, plus the new pallet bins. Right off, it was easy to see that the pallet bins would be better for us than lugs. We found, for instance, that the depreciation of bins and special equipment would be 2 8/10 cents less per unit than depreciation on lugs. Further, we felt that bins would enable us to incorporate efficiencies in our harvesting procedures."

After investigating several materials, Smith orchards built bins with fir plywood. They used a relatively high quality panel with a waterproof marine glue. Outside dimensions are 47 inches square and 33¼ inches high. They have a 32½ bushel capacity. The side panels are made of ⅝-inch exterior-type plywood and the bottoms of slotted 1x6-inch boards. Plywood was chosen for the sides because it offered smooth, crack-free surfaces which would not cause injury to the fruit. It also had the advantage of inherent two-way strength which would resist racking and contribute to longer bin life.

Empty bins, usually decked two high, were hauled from the packing plant to the orchard on straddle carriers. They were unloaded and distributed on trailers pulled by tractor or jeep and placed in the orchards convenient to the pickers. Pickers empty their drop-bottom picking bags directly into the bins.

A Raise for Pickers

"At first, some of the workers were skeptical and resisted the new idea," Horace Smith recalled. "It wasn't difficult, however, to convince them that they could do as well or better with this system. As a matter of fact, it's a fairly accurate estimate that the picker can do 10 percent better picking into bins than into lugs or apple boxes. Supervision is less of a job, too."

When the bins are full, they are picked up by tractors with forklift attachments and moved to the loading area. The boxes are not touched by hands.

At the loading areas, bins are set on skids ready for the straddle truck to haul them to the packing plant. The truck hauls 14 bins at a time, or the equivalent of about 450 bushels. One truck, since it can load and unload quickly, is capable of taking care of the Smith brothers' three producing orchards.

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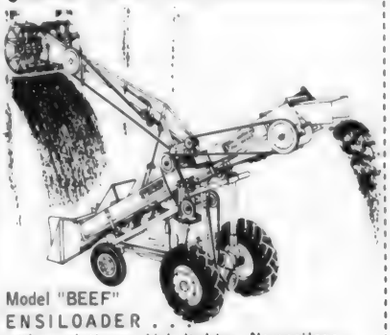

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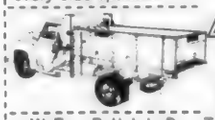

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"Probably our biggest advantage in the use of bins has been the ability to get the fruit off the trees quickly. Our straddle truck carries the equivalent of 160,000 loose boxes to our plant in bins, all within 24 hours or less from the time the fruit was picked. Previously, we had never come close to such a record. This gives us wonderful quality and a marked competitive advantage.

"Then, of course, there's the cost savings we had not foreseen when we first converted our operation to bin harvesting," Roger Smith pointed out. "It had cost us 5.78 cents to move an apple box to the orchard, pick it up, and return it to the packing plant. This same procedure, using bins, costs only 2.82 cents."

A further advantage of bins comes from the storage space gained. Smith says the use of bins has increased his storage capacity 20 percent. Other growers in the area have reported increased capacity as high as 35 percent. In the potato area growers save a third of the space used in storing empty bins by building them of such a shape they can be nested—one box stored edgewise inside another and a third enclosing it upside-down on top.

HOW BIG

The problem of size of the pallet box for potatoes has been worked out by Edward F. Johnston, of the Potato Handling Research Center of the Maine Agricultural Experiment Station. In general, he says to make them as big as is *practical*. It costs as much to move 1,000 pounds in a palleted box as it does to move 2,000 and, up to a point, the bigger the box the less the cost per unit of capacity. The limits set by practicability are the weights the fork trucks can lift; the best size for road truck widths; the height a fork truck can raise a box; the visibility of the operator of the fork truck. The recommendations of the Potato Handling Research Center:

For Boxes Which Can Be Nested:

Box: 48 inches long, 54 inches wide, 42 inches high, outside dimensions. Capacity approximately 2,080 pounds. Plans for pallet boxes of this size are available from the Maine Agricultural Experiment Station.

Forklift: Capacity 3,000 pounds at 24-inch center, cushion tires, 130-inch to 144-inch maximum for elevation, side shifter optional.

For Boxes Which Cannot Be Nested:

Box: 48 inches long, 54 inches wide, 47 inches high, outside dimensions. Capacity approximately 2,350 pounds.

Forklift: Capacity 3,000 pounds at 24-inch load center, cushion tires, 144-inch maximum fork elevation, side shifter optional.

or, but this will cost you more—

Box: 48 inches long, 54 inches wide, 51½ inch high, outside dimensions. Capacity approximately 2,600 pounds.

Forklift: Capacity 4,000 pounds at 24-inch load center, cushion tires, 168-inch maximum fork elevation, side shifter optional.

Since bins receive rough treatment in the orchard, in the plant, and enroute, they must be strong—strong enough to stand racking and considerable abuse. They must be made so that injury to the fruit is avoided as much as possible. Inside edges must be smooth, and corners rounded or smooth.

The design and materials used in the construction of bins have received a great deal of attention. Bins have been built with fir plywood and both western softwood and eastern hardwood boards. Originally, growers were attracted to price rather than quality, but recently the trend has reversed. The question now is what material and design should be used for increased strength and durability. Growers also want to know the amount of added cost which is economically justified to give reasonable bin life.

Thus, the choice boils down to a determination of low initial cost and relatively shorter life of boards vs. slightly higher cost and increased life expectancy of plywood.

Several types of bins are scheduled to undergo tests at the U.S. Forest Products Testing Station at Madison, Wisconsin. The units will be subjected to accelerated weather and rough handling tests. The results of these experiments will aid the forest products industry in the development of better units. Large bins lend themselves to automation in efficient handling of agricultural products. This means less effort, more profit, and fewer backaches.

THE AUTHOR: Frank C. Beeson is a 33-year-old by-product of an eastern Oregon cattle and sheep ranch. He holds a degree in business administration and a Master's degree in journalism, both from the University of Oregon. He was formerly Executive Secretary of the Oregon Cattlemen's Association; then editor of the *Western Fruit Grower*. At present, he is a specialist for the Douglas Fir Plywood Association.

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Other farm uses for polyethylene pipe include: livestock watering, sewage systems, drainage systems, and lawn sprinkling systems.

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Send for literature. Koppers has two booklets that will help you, "Polyethylene Pipe—Yours for Better Living" and "How to Select and Install Polyethylene Pipe." For these and the name of your nearest polyethylene pipe dealer, or manufacturer, write to Koppers Company, Inc., Plastics Division, Dept. FQ60, Pittsburgh 19, Pennsylvania.

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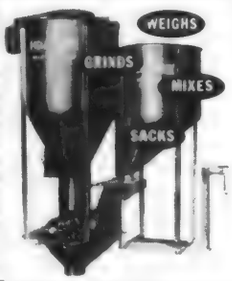

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BLUE CHIP SHEEP

(*Continued from page* 62)

off the sheared sheep. In summer shearing they move over to the lambs.

7) Early shearing eliminates the necessity of tagging—removal of the wool around the udder and up to the base of the tail—before lambing.
8) It eases the work load in June, one of the busiest periods of the year.
9) As April 1 is the beginning of the new year under the government wool program, February shearing offers a choice of selling the clip in either of two years, a choice governed by such factors as the going market, the incentive payments, and the tax situation.

Despite all these advantages Nick Bielenberg has a few cautionary words for those who would try it. "First," he warns, "you must have shed or barn room to protect the band for a few days after shearing. Then, it's a good idea to see that your shearing crew uses new 10-tooth combs on their clippers rather than 13-tooth combs. The 10-tooth comb leaves maybe three-sixteenths of an inch more wool on the sheep to provide extra protection from the weather."

Another common practice must be given particular attention with early shearing. This is shrinking the sheep beforehand. Individuals that are too full are hard for the shearer to handle and are prone to injury. So the sheep should be held off feed and water for twelve hours or so before shearing. This precaution has enabled the pregnant ewes to come through the ordeal of the shearing shed without mishaps to themselves or their lambs.

After shearing, the Williams and Tavenner band gets a ration of three pounds of hay, and six pounds of silage with one-half pound of shelled corn, or about half again as much as would normally be fed. The silage and corn are fed from a self-unloading truck which mixes as it spreads great spirals in the sheep lots.

Core Testing

As already explained, all the fleeces from the blue tag bunch as well or those from the ewe lambs and ram lambs are weighed, graded and put through the squeeze machine at shearing time. The clip is bagged, about 280 pounds to the bag, and stored in the loft of the old horse barn for the wool buyers to inspect and make their bids.

As soon as the clip is completed, representatives of the Montana Wool Laboratory collect samples for a core test. The tool used for collecting the samples is a two-inch steel tube about two feet in length. At its mouth is a scalloped blade for cutting into the wool. Driven by an electric drill, the tube is inserted into the wool bag, extracting a core of wool as it is withdrawn. One hundred to one hundred and fifty such samples are taken from a clip the size of Williams and Tavenner's (about 33,000 pounds); and at the same time samples are also taken for staple length measurement by the

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Extra Sturdy—Guaranteed

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in 28-ft. Widths

Wider, roomier Home-Ways provide the space that's needed for large, active families. Home-Way 28-ft. clear-span, nailed-glued roof trusses add up to an extra room in living space with little increase in manufacturing, erection and finishing, or site costs.

FREE Catalog-Brochure shows pictures, floor plans of Wide-Span models from 1008 sq. ft. 3-bedroom to 4-bedroom and larger. Choose from four basic "600 series" models and Wide-Span Prairie Lady X-55, or let your Home-Way dealer have us custom-design one just for you.

GBH-WAY HOMES, Inc.
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use of a wool hook (a steel rod about 20 inches long with a tapered, barbed hook on the end).

The core samples are placed in waterproof bags so there will be no variation in their moisture content and are taken to the Wool Laboratory at Bozeman. Here they are blended, scoured, and dried and put through a series of tests to determine moisture and ash content, and vegetable matter and grease in the wool.

At the end of the test a certificate is issued showing the shrinkage. Clips may shrink anywhere from 32 to 78 per cent. The Williams and Tavenner clip usually registers around the 50 percent mark. Core testing is meaningful only on clips of uniform grade.

The ranch insists on a core test each year because they sell their wool on a clean basis rather than as grease wool. The test takes the guess work out and gives them a solid basis for bargaining even though the buyers require that another test be made by one of the private eastern laboratories such as United States Testing Company, or American Conditioning House.

Good Management

The same meticulous attention to detail practiced at shearing time is carried on throughout the year. At lambing time hundreds of jugs, small pens, are set up in the sheds. After the birth of the lamb each ewe and her little one spend a short time in one of the jugs to get acquainted. Until they go on grass the ewes are on a ration heavy in oats to stimulate milk production.

Nick shoots for a 165 percent lamb crop at birth. Natural mortality and elimination of twins from the young ewes cuts the crop to 130 to 135 percent by the time they go on range; and a 110 percent crop at weaning time is considered good after the rigors of life on the summer range.

As the ewes and lambs come out of the jugs the range groups are made up for the summer. One band is made up of ewes and their ewe lambs, another of ewes with ram lambs, and a third of yearlings and drys. These are usually trucked to a forest lease some 160 miles or so to the east of the ranch.

The band in which the buck lambs are included go on range close to home. By August 20 these young rams are weaned and taken to their own pasture.

All the sheep are brought in by the first of October for the fall sorting which, as explained above, is one of the important phases of the performance testing program. The ewes are turned on the regrowth of the hay meadows for flushing. Bucking begins the first of November and the rams are taken out before Christmas.

On winter range the sheep get a supplement of ¼ to ½ pound per day of molasses cake or other 20 percent protein supplement, the amount depending upon weather conditions and the length of time it has been necessary to feed the supplement. They have had success at the ranch in preventing foul foot in their cattle by adding organic iodine to the salt and are now trying the same procedure with the sheep. Internal parasites are no problem.

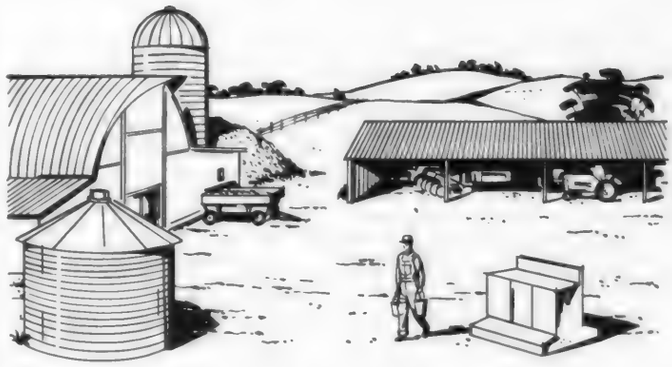
The most serious scourge of the flocks, according to Don Tavenner, is blue bag or mastitis. "If the shepherd can spot it right away and treat the ewe within the first few hours with sulfamethazine it can be whipped," he says. "But that's a big job when you're working with large bands.

"The mountains exact a heavy toll every summer, too. Bears and bobcats are our biggest problems up there. Last year we lost 30 lambs out of one band to the bears."

Look, Ma, No Horns

While the oldtimer may have looked with pride upon his rams' horns as a sign of masculinity, many modern breeders want no part of them. The wool around the horns retains moisture and makes a perfect target for flyblow and maggots. "The competition is producing polled rams and we have to meet that competition," Nick says. "But we're not going to do it by crossbreeding. I use an electric dehorner on some of the buck rams. It's not a pleasant job and you don't always get perfect results, but the buyers sure like the ones that turn out well. And with practice I'll get one hundred percent results. This is just one more step in developing quality."

And quality is the keynote on the Williams and Tavenner Ranch.



Galvanized Steel and Today's Farm

Gives greater economy, longer trouble-free life to farm buildings and equipment

A galvanized sheet is steel with a coating of zinc. The zinc protects the steel from corrosion caused by exposure to air and moisture. Because of this economical combination of strength and corrosion protection, engineers and designers are finding many uses for galvanized steel to give today's farmer greater value.

Where is it used and why?

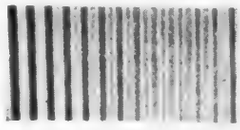
Galvanized steel is used in grain bins, feeders, wire cribs, wagons, elevators, tanks, pipes, fence, buildings. Low initial cost, ease of forming, and simplicity of application are three of the basic reasons. Galvanized steel buildings are permanent, weatherproof, fire resistant, rodent proof, and make an attractive addition to any farmstead.

Do galvanized sheets differ?

All galvanized sheets are good and give years of useful service, but they are not all alike. The heavier (or thicker) the zinc coating, the longer before maintenance becomes necessary. Galvanized sheets are made with a variety of coatings ranging from less than 1 oz. per square foot to 2.75 ozs. The heavier coatings will last 30 years or more before rusting in rural atmospheres.

What should the buyer look for?

Look for the label. Here are pictures of three samples of galvanized steel sheet that are generally available.



Unlabeled galvanized sheet — weight of zinc coating unknown.

A labeled commercial coated sheet. The buyer knows its probable rust-free life because the label says "1.25 oz. zinc coating."

A labeled sheet of higher quality, proven by time to give extra years of rust free service. The buyer knows from the 2 oz. label.

Reports from thousands of users of galvanized steel sheets come from all over the country. 2 oz. coated sheets in actual use show 21, 22, 25 years and more of maintenance-free service.

Send for free information.

A variety of literature, educational films and filmstrips is available without obligation to individuals and groups in the farm field. For more information on Galvanized Steel and Zinc, or for help on a related problem, write

AMERICAN ZINC INSTITUTE, INC.

Field Office: 324 Ferry Street, Lafayette, Ind.

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STORMOR BINS

Grain stored in high quality, low cost Stormor steel bins is just like money in the bank for two reasons:

First, it's well protected. Second, it earns you extra returns through government storage payments and/or your ability to hold the grain for the year's top market price.

Stormor bins are built of the heaviest gauge galvanized and corrugated wall sheets with all vertical seams sealed; offer largest door for emptying, steep pitch roof with full 24-inch hatch. Full range of sizes from 1,000 to 20,000 bushels.

STORMOR DRY-O-MATION

Lowest cost way to store and condition your grain—a combination of Stormor bins with automatic humidity control. Special drying fans and supplemental heaters maintain ideal temperature and moisture. Bins and conditioning equipment may be purchased separately or as complete units.

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Thousands of louvered perforations in heavy gauge galvanized wall sheets permit natural air circulation while protecting the grain against the elements, birds and rodents. Can be equipped with center ventilating tube, fan and supplemental heater. Nine sizes, 500 to 3,500 bushels.

STORMOR BATCH DRYERS

Here's the dryer that truly offers better drying at less expense. It dries more than 200 bushels of shelled corn per hour, from 25% to 15% moisture, for less than two cents per bushel. It operates at only 140 degrees of heat, removing only the moisture. It saves time and labor because its big capacity and automatic safety controls eliminate the need for constant attention. Equipped with 36" fan and 4,000,000 BTU burner. Operates off 10 HP motor or tractor PTO. Three sizes: 750, 1,000 and 1,250 bushels.

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( ) batch dryer ( ) steel bins ( ) distributorship

( ) steel cribs ( ) fans and heat units ( ) dealership

NAME _____

ADDRESS OR RFD _____

CITY _____ STATE _____

CALLING ALL HOGS

(*Continued from page* 75)

pig, in a lower key given quickly and possibly serving more to allow the caller to catch his breath than for summoning the pigs. Soo-o-o-ee-e-e was just as acceptable as whoo-o-o-ee-e-e, but was used less. Those who used piggie-piggie-piggie instead of pig-pig-pig were regarded as effeminate, and anyone who would reduce the standard pig-pig-pig to corruptions such as piggie-wiggie, piggie-wiggie, was looked down on. The introduction of any sound that resembled a yodel was frowned upon as an affectation, although the temptation was often great if a caller could yodel. A trill at the end of a series was valued provided it was restrained and in good taste. It was thought that the trill was what really brought the hogs. Cupping, holding the cupped hands like a megaphone, was controversial, but permitted in most contests.

Hog calling soon became an institution. Informal contests blossomed at country sales and at Saturday afternoon gatherings of men at the blacksmith shop. Calling became an established and a popular part of the entertainment programs at county fairs. The winners went on to compete at state fairs, and then, inevitably, there were national contests to determine the best hog caller in the world. These contests reached their peak in the middle twenties. Pictures of champion hog callers appeared in the papers, they were invited to appear on radio programs, they were interviewed and their autographs were sought.

Hog calling reached its peak in 1926. It was that year that the first national contest was held, and it was that year that the National Swine Growers Association drew up a standard set of rules and regulations to govern contests. Meeting in Des Moines, Iowa, the Association agreed on five main rules to guide judges. Callers and calls were to be graded on (1) carrying quality, (2) hog appeal, (3) variety, (4) musical appeal, (5) distinctness.

The first national champion was Fred Patzel, of Madison, Nebraska. It is said that when Mr. Patzel made his first appearance on radio he blasted a tube. "I don't know what might have happened if I had let go," he said. "I sorta held myself in."

John Philip Sousa was once a judge in a hog calling contest. Mr. Sousa accepted the honor, believing, as he said, that he was to judge hogs instead of men, but he went through with it. He picked Milford Beeghley, of Pierson, Iowa, as the winner. Mr. Beeghley was one of the greatest and undoubtedly deserves a niche in the Hog Callers Hall of Fame, if such is ever created. He appeared all over, at state fairs and other gatherings, was very popular on radio, and an after-dinner speaker of importance. In describing his call he said, "I always breathe three times. Who-ee, in one breath; whoo-eeee, in two breaths, but higher in pitch." Then Mr. Beeghley added "pig-ee, pig-ee, pig-ee," in an ascending scale, and he ended the whole call with a trill. "It's the trill that gets the hogs," he said.

Although he made a lot of money on radio, he always maintained that it was the radio that killed hog calling as an art. After his retirement he is reported to have said, "Radio debased hog calling." In commenting on the present decadent state of hog calling he said, "How they ever learn, with everybody using self-feeders, is more than I know."

As hog calling petered out in the forties, contests petered out also. The hog caller lost his standing as a celebrity. The last champion was Fred Shaw, who was crowned in 1947.

About this time progress began to gnaw at the vitals of hog calling. Fields became smaller and hogs could at times be summoned by merely rapping on the barn door with a broomstick. The art of calling fell off. The death blow came when the self-feeder was introduced.

Today a hog caller is as rare as a blacksmith. In some isolated areas of New England and the southern mountains men still call hogs, but calling is no longer an art because there is no incentive except to get the hogs in, and there is no discriminating audience who could distinguish between the harsh call of the army sergeant's "Come and get it," and "whoo-o-o-ee-e-e pig-pig-pig," delivered in a rich tenor on a summer evening.

THE WEATHER EYE

(*Continued from page* 69)

of light. One beam of light cannot be seen, but when there are countless thousands of them, as in a cloud, you get a distinct impression of the density and size of the cloud, its rate of progress, and position.

Tony Sands, WLW meteorologist, says, "During the last few years we have been working with several large farms in the region. We see a thundershower as much as 60 miles away from Cincinnati and can tell the individual farmer when the shower will arrive, whether or not it will go across his farm, and how much precipitation he can expect. A farmer, by consulting radar information, may have as much as six hours grace in getting in a cutting of hay."

Tools of the Trade

The meteorologist has a preference for blonds, if he has to make a choice, and for a very strange reason. Nothing has been found, including fancy electronic devices, that can match a strand of blond hair as a means of measuring humidity. The gadget which the meteorologist uses to measure humidity includes 12-inch lengths, exactly, of blond hair. The hair shrinks or expands in tune with air moisture.

The farmer also has other devices to determine such things as temperatures and barometric pressures. If he has a cricket on the hearth or under the porch rail, he can count the number of chirps in 14 seconds, add 40, and get the temperature almost on the nose. This is not an old wives' tale, but actual scientific fact. If you have an old scar or a mended broken bone in your system it might be a quite accurate gauge of barometric pressure. When the outside pressure of the air is lower than 15 pounds, which is average and is the pressure your body is tuned to, the juices, fluids and the air within your body push outward. Your joints begin to push out and old aches and pains appear in broken bones and scar tissue, so that oldtimers had reason for saying, "If a broken bone begins to pain, soon we will have rain."

Among oldtimers certain favored people in the community had what was known as the "Weather Eye." There was no magic or hocus-pocus in their forecasting. They were just more observing and knew how to interpret the signs.

Among the signs they read in the heavens were the clouds, the form and color of sunsets and sunrises, halos and coronas around sun and moon, the behavior of birds and plants, and the humidity and barometric pressures as transplanted through their bunions, corns and body juices. The old saw that a red sunset presages clear weather on the following day, and that a red sunrise means just the opposite, is quite well founded in fact. The weatherman explains that cold air boiling and churning carries with it dust from the earth and creates a red sunset or sunrise. If the redness is in the west, from which our prevailing winds blow, clear weather will likely follow. If it

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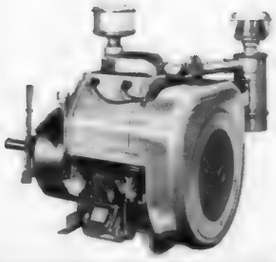
that **BEATS** the **HEAT**
and licks the job!



The weather is never too hot for haying with this New Holland 178 Haycruiser, powered by a 51 hp. Wisconsin AIR-COOLED Engine.

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It's a fact — the weather is never too hot for day-in and day-out field service, if your equipment is powered by a Wisconsin Heavy-Duty Air-Cooled Engine. If the thermometer should hit an incredible 140° F., you would still have no cause for concern. This gives you a wide margin of safety under sizzling hot-weather operating conditions.

So why fool around with a water-cooled engine? Why risk over-heating and damage due to evaporation, lime- or alkali-scaling and clogging? Why be responsible for a lot of extra parts (up to 26) that may need servicing and replacement on a water-cooled engine? And why mess around with water-cooling chores?— *at any season!*

You don't have to be concerned about any of these things if your equipment is WISCONSIN-POWERED. Hot-weather serviceability in all sizes (3 to 56 hp.) is the result of highly developed AIR-COOLING ENGINEERING that is the result of more than 50 years of engine-building experience.

Play it smart as so many other hot-weather-belt farmers are doing. Specify "Wisconsin Power" for your equipment. Write for Bulletin S-249. Address: Dept. F-60.

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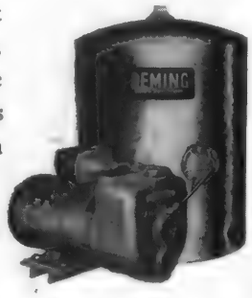

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is in the east, the boiling air is receding and a storm will follow from the west.

A halo around the sun or moon is caused by light filtering through ice crystals in the high strata of the air. The weatherman makes a distinction between a halo and a corona; the latter has a red spectrum. Both the halo and the corona indicate that moisture is coming into the region and will increase within the next 36 hours. The halo, or corona, which is reflected from a much lower mass of moisture, should be considered with wind direction for good forecasting. Clouds moving directly from the south or west mean that the moisture is moving from the source of your usual water supply. If the halo around the moon increases during the night, or if it develops a red corona, then the clouds are lowering and moisture is coming in quickly.

The dew is quite a good forecaster. We say, "In the morning dew on the grass, rain will not come to pass." Dew will not form unless the air is very quiet, and when the air is quiet there is little likelihood of a storm during the daylight hours.

There is a belief that when certain trees turn their leaves upside down toward the sun a change of weather is imminent. Likewise, they believe that squirrels store more food for a heavy winter than they do for a light winter, and that caterpillars spin heavier covering for a heavy winter.

The Daily Forecast

The reports you get in your newspaper are usually from 10 to 12 hours old. They are based on probabilities. One of these probabilities is the speed with which a front is approaching. If the speed slows down, then the weather will be delayed just that much; if it picks up speed, the front will arrive before predicted. It is easy to adjust to this vagary by adding or subtracting the time that the weather varies from the published reports.

The weather for the entire country is forecast by the nearest U.S. Weather Bureau station at 10 P.M. and 10 A.M., and at 5 P.M. and 5 A.M. You can always get first-hand and immediate information on the development of the published reports by calling your weather bureau or your radio station. Few people take full advantage of the Weather Bureau services, which are maintained to help taxpayers.

It is a good thing, too, to know what the weatherman means by the simple and terse phrases he uses in his reports. The one word, "Rain," means rain over the entire area throughout the period of the forecast. "Intermittent rain" means rain about 50% of the time over the entire area. "Showers" means some rain at sporadic intervals. "Scattered showers" means 30% to 50% of the area will receive some rain. "Widely scattered showers" means less than 20% of the area will be rained on. "Cloudy" means that the sky is obscured at least 90% of the time. "Partly cloudy" means clouds 50% to 70% of the time. "Fair" means that there will be no precipitation, but

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there may be clouds over the sun up to 30% of the time. "Clear" means just that —not a cloud in the sky, the snail is on the thorn and God is in His heaven.

In addition to the official weather forecast provided by the United States government and supplemented by newspaper and radio reports, a number of commercial outfits provide weather information for a fee. These commercial forecasts are just as good or just as poor as the ability of the men who supply them. Many of them are able and trained meteorologists who use the same methods as the government services to predict the weather, and many have worked with the weather bureau for several years or more. They usually use U.S. Weather Bureau data but supplement it and refine the forecast to meet the needs of their clients. Their reports may be quite valuable to the farmer, fruit grower, or vegetable grower. It is in frost prediction that they serve their greatest purpose. If their abilities are brought to bear on a particular area, on a specific problem of the weather, they can be more valuable than the government reports, for the reason that the government forecasting must be general and cover a wide area, whereas the commercial services supply specific reports on restricted areas.

What is the future for weather forecasting? The accuracy of weather forecasts has been going up and up; not a great deal at a time, but slowly the percentage of accuracy has increased. The 5- 30- or even the 60-day forecast is now in the offing. How soon it will come depends upon how quickly research can be completed and analyzed. Not only the government, but the National Science Foundation and other organizations have large research teams working on long-range forecasting.

In describing the problems ahead, Tony Sands, who once worked with Dr. Jerome Namias, known as the father of long-range forecasting, states the problem: "Long-range forecasting will come when we know all about the behavior of the atmosphere. Atmosphere is essentially a fluid about as thick, in relationship to the earth, as the thinnest onion skin is to a big onion. When you throw a rock into any fluid it stirs up ripples and currents. Just so the atmosphere has waves and currents in it, and our job is to study the interrelationship between these waves and currents and their effect on each other. We must examine the entire face of the northern hemisphere, or even the world itself, and figure out what these currents are going to be doing in 5, or 30, or 60 days. This involves a tremendous amount of computation which has been speeded up by electronic brains.

The observation of the ripples and currents has been refined by the launching of a television-equipped satellite on April 1, to scan and report the cloud formations over the entire earth every 90 minutes. This is our new "Weather Eye."

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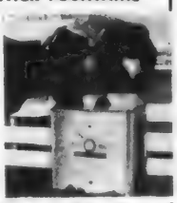

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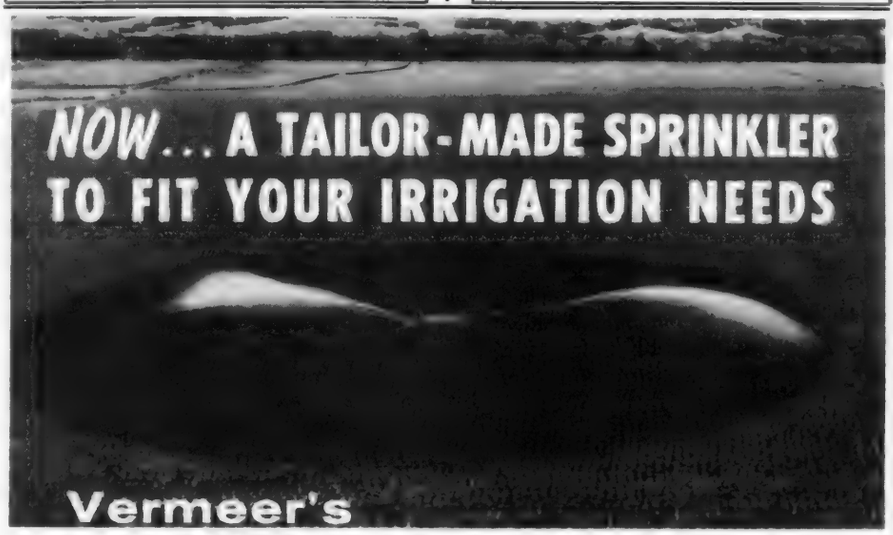

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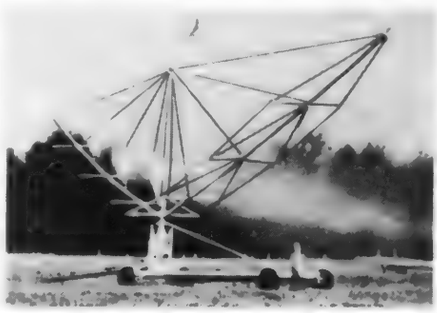

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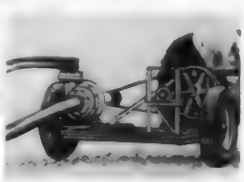

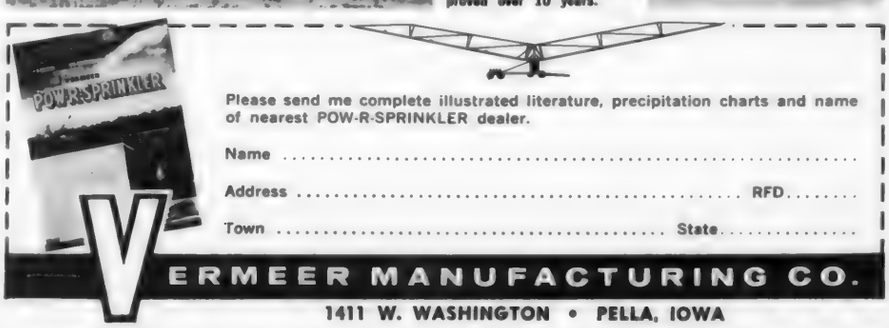

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SUBURBAN Wheel Horse YARD and GARDEN TRACTOR

LAZY SUSAN FEED LOT

(*Continued from page 92*)

steel-reinforced walls, are equipped with a top unloader transferable from one to the other on a track under their common roof, and a chute for the feed.

A question certain to arise was what to do about mixing and weighing feed. "It's absolutely essential in this kind of operation to weigh the feed," Matthews said. He visited several other units in operation and finally, instead of a regular feed mixer, he mounted the bed of a self-unloading feed wagon on 6,000-pound capacity scales.

The scales are installed in the feed shed where silage from either of the silos can drop directly into the wagon bed, wet corn can be augered into a one-day-size holding bin above it, and supplement can be augered from just outside the shed. A drag in the bottom of the feed cart empties the complete ration into an auger system that drops it into the augers over the feed bunks.

This one auger, centered at the mixing wagon and pivoting from it like a spoke from the hub of a wheel, can reach in turn from the feed room to the loading end of each of the three feed bunks.

Alongside the scales is the electrical control center from which the whole feeding operation is managed.

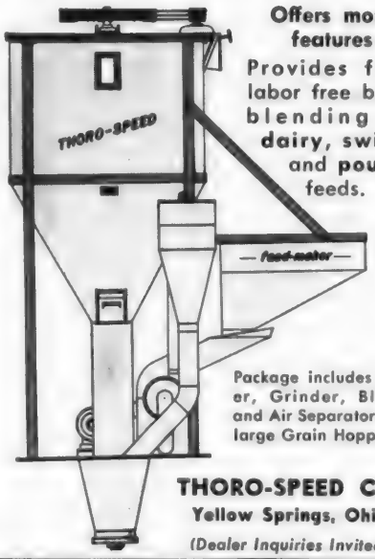
"Feeding cattle with this arrangement," says Harry, "is as simple as reading a chart and pushing buttons." Twice a day, one man spends 45 minutes at the chore. That amounts to 1.8 seconds per animal per day. The first thing he does is stop by the Harvestore to open the seal, the only operation he can't handle from the feed room. He fills the corn bin then returns to close the seal. Back in the feed room, he sets the scales to balance when he has dropped into the feed cart 6 pounds of silage per animal, one-half their daily ration. On top of this he drops 7½ pounds of shelled corn for each steer, and one pound of 32 percent protein supplement per head. This is the morning feeding for one of the six lots.

Augers in the wagon box mix the feeds, the drag empties the bin, and the action of the auger lifting the ration to the feed bunk completes the mixing. This is repeated for each pen of animals being fed; then the machinery is turned off, the doors closed and that's that for another 12 hours. "This," says Basil Cornett, "is doing it the easy way." Cornett is a veteran of 30 years at Trelawny Farm who recalls when the husking peg was a major time saver.

There is not much separation of the feeds either in the augers or in the bunks. The cattle clean up the mixture by the time the next feeding is due. So far only small amounts of shelled corn have passed through undigested — not enough to call for either cracking grain or running hogs behind the cattle.

The cost of this beef factory came as no surprise to Harry Matthews and Opekasit engineers. They had figured it out almost to the dollar before there was any decision made to go ahead with the construction.

CUSTOM-feed-maker by THORO-SPEED



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The total investment was $66,374. The three barns cost $13,316. Grading added $260 and concrete work $5,049. Feed bunks cost $3,135. Fences, gates, waterers, gravel and corrals cost $3,005. Cattle scales, installed with racks and other equipment, cost $1,764. The two silos, with roof and concrete work for the footers, came to $10,800. The Harvestores added $18,120. Mixing equipment, including scales and 7½ hp motor, tacked on another $2,078. Feed-handling augers, unloaders for the four silos and motors to power them totaled $3,097. Feed room, including the cost of supplement bin, cost $1,939 and the electric work came to $1,365. The three feed bunks, with motors and augers, cost $2,446.

Will it be worth it? The question is a good one and the answer will come at the cashier's window.

So far, the returns make the investment look sound. The first lot of cattle finished was a group of 50 heifers fed for 75 days. Before these animals were credited with any profit they were charged with every cost that went into their production, including a predetermined per head share of the depreciation on the installation plus a five percent interest charge on the investment. Such items as labor and feed costs, of course, were charged against them. The final net figure for the 75-day full feeding period only, was pure, refined net and it came to $5.57 a head, which on 900 head would come to roughly $5,000 a year. "If we can do this well," Matthews said, "we're in good shape."

The high cost of the installation makes it imperative that cattle fed here put on good daily gains. Feeding cattle in these lots, at current feed prices, costs 22c a pound if they gain two pounds a day. Gains of 2¼ pounds reduce the cost per pound to 19.7c and if they gain 2½ pounds a day they make beef at a cost of 17.7c a pound. They have to hit close to 2½ pounds a day gain to make a satisfactory net profit and on the cattle fed to date they have obtained gains between 2½ and 3 pounds a day.

One reason Matthews likes this kind of setup is that with six pens they can put in cattle of different weights and top them off for the market as they're ready. They aim to send a load to market every couple of weeks. To spread the risk they figure they should add 500 pounds to each animal that comes on the farm. Half of the weight will be put on in the pasture and stubblefield, half in the feed lot.

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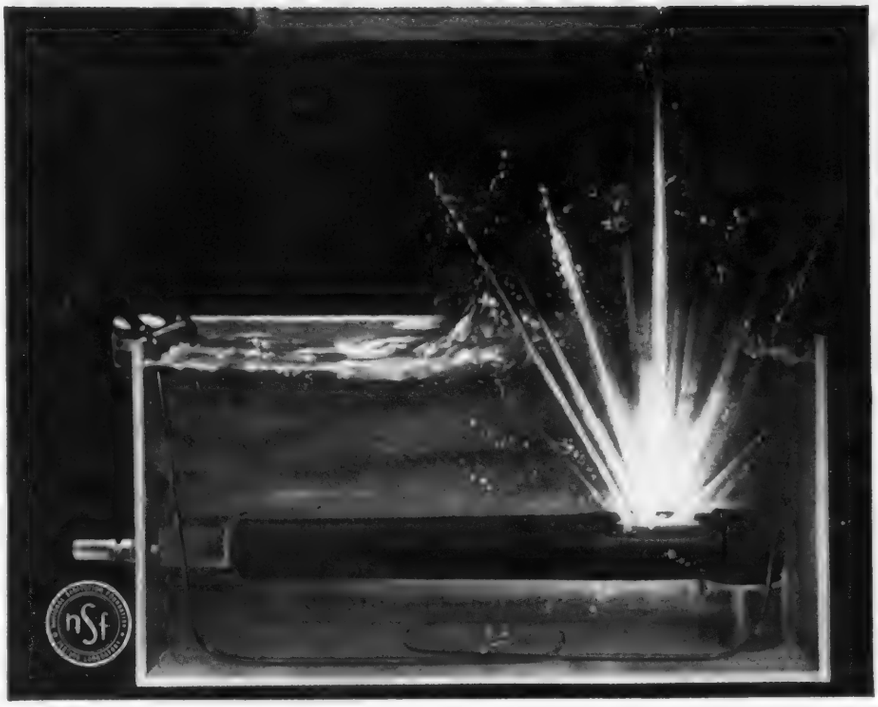

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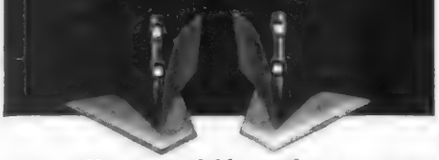
Lantz Row Sweeps increase yields up to 25%



State University field tests have proven that shallow cultivation increases crop yields up to 25%. Lantz Row Sweeps are specifically designed for this type of shallow cultivation.

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The plan is to buy both spring and fall stock. In spring they will buy thin, framy stock for pasture. Short term feeding of heavy animals concerns Matthews. There is shrinkage to cut profits both when you buy and when you sell, and a slight drop in price can be disastrous.

With his new feeding plan, Harry Matthews has the Trelawny feeder operation reduced to elements he can measure. He can tell when the system returns a profit and detect quickly if it produces a loss.

For this farm, he thinks the plan is a logical answer to the cattle feeder's current problems. Another farm might need another plan. But the major aim must be the same—more cattle with less work.

MEASURING AND MIXING SILAGE AND SUPPLEMENTS

(*Continued from page* 65)

using a small bin and a large one, both with bottom dump door. The smaller top bin lets silage fall through it into the larger bin. When this bottom bin is full, it dumps. To stop silage falling straight through both bins the top bin closes while the lower bin dumps.

When you leave simple weighing, the accuracy you demand has a lot to do with the cost of the equipment. So the accuracy we need is important. Hoyle B. Puckett is an engineer at the University of Illinois who specializes in materials handling. "How accurate you need be depends on whom you are talking to," said Puckett. "But the more accurate, the more expensive the machine. If we can do a satisfactory job with a less exact, but lower cost unit, we should use it. I believe if we can meter feed on an automatic basis, and are 90 percent accurate, we will be within the range of the other variables of feeds and feeding."

Puckett wanted a completely automatic weighing system. He knew automatic belt weighers had been used industrially for years. But they cost $2,000 to $3,000 each, too much for farm use. To beat this cost, Puckett has devised an electrical means of weighing silage, using a top silo unloader. The unit is still on paper but Puckett hopes to have a model working in September.

The electrical weigher will actually weigh by time—electricity will guarantee an even unloading flow, and then the weight unloaded will be proportional to operating time. The device is to work on a top-mounted silo unloader. A separate motor must drive the impeller that ejects silage from the silo. (This is not the case on most unloaders now sold.) The electrical weighing depends on the fact that the motor throwing silage out will use more current as a heavier load is picked up. Puckett's invention will measure the current demand. The variation in current will be used to raise or lower the whole unloader, to maintain an even flow. Too high current will mean too much silage is being

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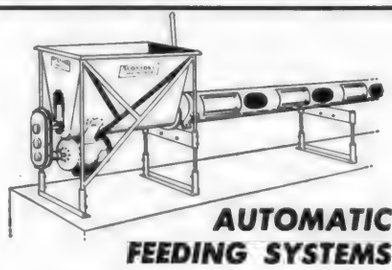

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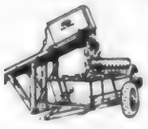

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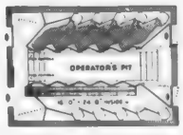

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unloaded, and the whole unloader will be raised. Thus less silage will reach the impeller. The opposite will happen if too little current is measured. The unloader will be lowered, and the rate of silage unloading will increase.

Many farmers have used a human substitute for Puckett's device. With experience they can get an even flow from a top silo unloader in most conditions. The problem comes when the silage is frozen.

One excellent device is the ammeter placed in the electric line to a silo unloader. It shows when the unloader is overloaded. It costs about $30 and can save an electric motor. It can be used as a very simple substitute for the electrical weigher. The farmer lowers the unloader by hand to maintain a constant ammeter reading, and then measures by time. Some farmers use ammeters on two unloaders: one in silage, the other in high moisture corn. They measure the proportion of each by keeping a known ammeter reading on each unloader.

The bottom silage unloader, found commonly on sealed silos will normally give a regular flow of silage. Here again time can be used to measure the quantity unloaded with reasonable accuracy.

Proper distribution of supplement can be achieved in two ways, either mixed with silage in a complete, blended feed, or alone, not intentionally mixed at all.

One difference between these two methods is the feeding space required. If concentrates are blended with silage, the bunks

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can be kept full, and 6 to 8 inches of bunk feeding space per animal is enough. But if the concentrates are separate, there should be 21 to 24 inches of space per animal (depending on the breed) so every steer can reach the concentrate when it is fed. With certain equipment, a compromise can be reached by distributing the concentrate, followed immediately by silage. The silage covers the supplement, and makes it hard for one steer to steal his neighbor's feed.

Automatic mechanical feeders vary in their ability to blend. The auger enclosed in a tube, or U-trough, with holes spaced evenly along its length will drop material simultaneously from all outlets. Supplement can be periodically or continuously added to the silage. Blending can be done in the bunk, by layering supplement and silage. Or previously blended material can be spread evenly in the bunk.

Shuttle stroke, chain type and auger feeders with a board on each side and no bottom require the material to be blended before the input point. Once the silage or supplement leaves the input in one of these feeders, it goes to a specific place in the bunk, and there is no chance to add or subtract components except by hand. If silage and supplement are to be fed separately in these feeders, the bunk must be clean before the next feed is sent out. Else the first feed will end up in a pile at the end of the bunk—or back at the start again. The only exception is a circular chain feeder, which can be "filled" with silage. Then supplement can be added as it rotates past the input point a second time.

Supplements cost money. It pays in cold cash to measure them accurately.

Like silage, a supplement can be measured by weight or volume. But better than 95 percent accuracy is easier to achieve with a supplement containing less than five percent molasses or fat—which includes most rations.

The simplest device is the scoop shovel. Before you laugh, consider that University of Illinois researchers showed 36 out of 37 farmers watched their silo unloader and automatic bunk feeder throughout the whole period they were working. They could easily have scooped a supplement onto the auger, got accurate measuring and good blending, and saved money on equipment. This may be a particularly good idea for a farmer with a small operation or little capital. It may also suit the cautious, who move into automatic handling slowly.

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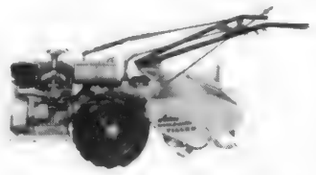

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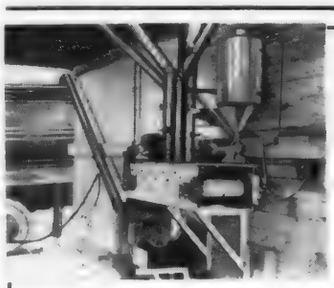

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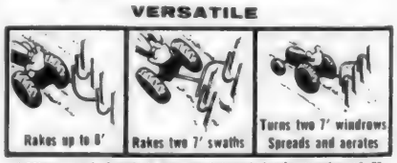

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Direct weighing is a common method, especially if the silage also was weighed. There are thousands of farmers who use a basket, sack or box to add supplements to silage. As with the shovel, these methods are fine if you must wait while the silage fills an auger or unloader wagon.

A farmer with an automatic system or with more than one wagon or wagon storage will want a continuous weighing system. If he can run the silage weigher and one or more supplement weighers together, at constant rates, the right feed is delivered continuously. This assumes that the silage flow from storage can be kept constant. At the moment this is apparently the only workable method of continuous measuring. The delivery rate of supplements and silage are synchronized to give feed in the right proportions.

The three commonest basic methods to measure concentrates (or grain) in a continuous flow are the vibrator, the belt and the auger.

Most vibrators have a hopper feeding onto a vibrating tray. This tray is tilted so feed shakes off. Vibrators are not usually as exact as belts or augers, but they will measure feed with 95 percent accuracy. The advantage of the vibrator is that it is light, simple and easy to install. Small units will meter grain or supplements at rates of 2,000 pounds an hour. It is particularly useful for experimenting in the early stages of setting up a system.

The rate of flow can be varied electrically or mechanically. The mechanical methods include using a bigger tray, or tilting the tray at a steeper angle, or having a deeper layer of feed in the tray. It can be done electrically, in conjunction with any of the above, by changing the voltage to the vibrator. The vibrator costs around $75. Two manufacturers are the Eriez Corp. of Erie, Pennsylvania, and the Syntron Co. of Homer City, Pennsylvania.

A horizontal belt does an accurate job of measuring concentrates. A hopper or pipe delivers feed to the belt and it is kept at a certain level by using a strike-off door. This holds back excess feed and keeps a uniform depth on the belt. The rate of flow can be controlled by varying the belt speed or adjusting the strike-off door or pipe. A belt can measure larger flows than the vibrator. It is less susceptible to humidity, sticky feeds or corrosion, and wide changes in flow rate can be made simply. The Decker Manufac-

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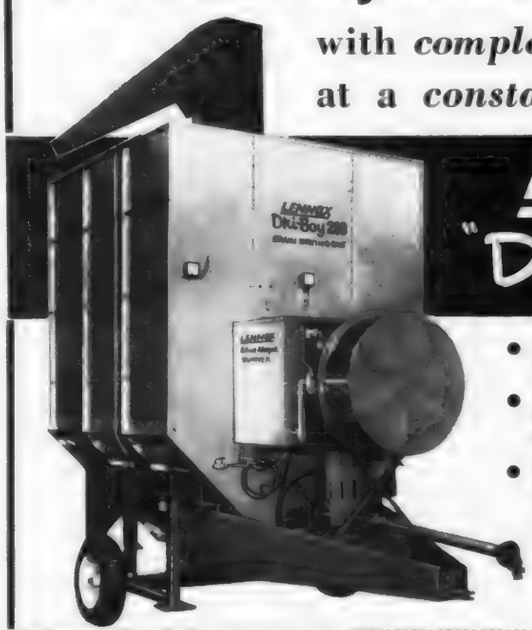

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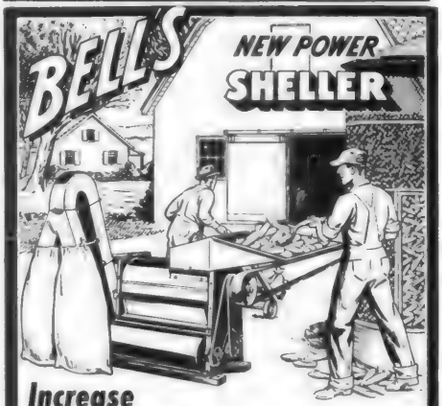

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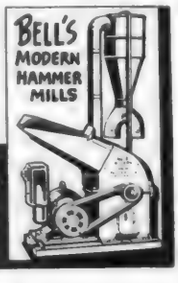

The **C.S. BELL CO.**
Manufacturers
HILLSBORO, OHIO

turing Co., 2500 N. Main, Rockford, Illinois, makes a belt meter. It has movable pipes over a constant speed belt and costs roughly $300.

The auger is an accurate and common means of regulating feed flow, and it comes in a wide range of prices and delivery rates.

One of the smallest and cheapest is the Scru Feed'r ($60, including motor) made by Van Dusen & Co., Wayzata, Minnesota. This is a single, wheelbarrow-sized hopper with a constant-speed 3″ auger in the bottom. A hole in the bottom of the hopper with a sliding gate controls the flow.

A good, accurate unit can be made from a single auger and a variable-speed drive unit on an electric motor. The speed unit costs around $125 to $150. It is more accurate than a device which throttles input to an auger, as the latter causes bridging.

For farmers who want to blend and measure concentrates there are at least two "multi-auger" machines. The oldest is the Mixmill made by Belle City Engineering Co., Bluffton, Indiana. The Mixmill uses four augers to measure feed. A dial on the mill controls each auger, and a fifth dial can speed up all the augers together, maintaining the proportional speed between them. The Mixmill auger meter is a complete measuring, mixing and grinding unit, but the measuring device is available separately and will adapt to fit most rolling, crimping or hammer mills. The cost is about $400. The four augers feed from four small hoppers. Gravity feed-bins can be installed above these hoppers, or automatically controlled augers used to keep the hoppers full. The accuracy on these units is 98 percent or better.

The Meter-Blender was developed, and is sold by W. E. Stevenson, Route 1, Marysville, Ohio. It comes as a 500-pound hopper with two smaller 150-pound hoppers on either side. It is available with or without either side hopper. Like the Mixmill, the Meter-Blender has widely adjustable auger speeds for different feed rates. The price is $250, $300 and $500, including motor, for the one, two and three-hopper sizes.

In most systems, you don't have to plan for mixing, it just happens as you do the other jobs. Feed carried by an auger, and feed spread in a bunk from an unloading wagon are quite evenly blended.

This mix is not perfect, but it is a blend from which an animal cannot separate any one item. Usually this is enough. For mixing high potency supplements into a feed, where a perfect mix is vital, accurate weighing into a batch mixer is the common answer. The batch mixer stirs all the ingredients with a vertical auger or possibly some form of beater. This is normally only used to prepare a concentrate, which is then blended into a feed using some less accurate means of weighing and mixing. If two concentrates are put into a hopper in layers, one on the bottom, one on the top, they come out in a rough-and-ready mix. The auger feeds from the back of the hopper, which is emptied first, and the two

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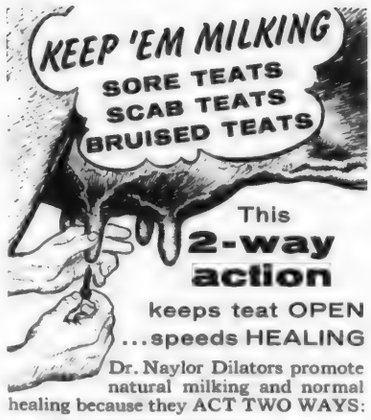

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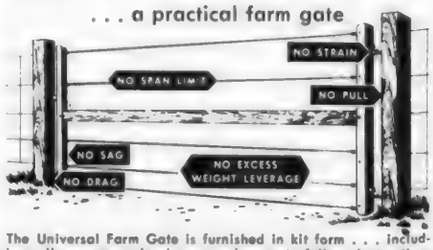

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materials then fall evenly to the auger and mix in its length. A similar mix occurs in a self-unloading wagon when a load of silage is leveled off and concentrates spread evenly on top. The beaters and delivery spout do sufficient mixing to prevent the livestock from sorting out one ingredient.

No system is going to be perfect. All are certain to need some adjustments.

All measuring devices must be checked when they are installed to get the actual delivery at various adjustments.

After good, sound equipment (and don't use lightweight materials even if they are cheaper), a farmer's best friend is a competent dealer-salesman. Such a man is Charlie Hudson of Carlinville, Illinois. He has engineered several good farm forage-concentrate setups in southern Illinois. One such setup is the 1,200-acre corn, grass and cattle farm of Randall Loveless, Route 4, Carlinsville, Illinois. Loveless, a tall, quiet farmer who fattened 5,500 cattle in 1959, has two sealed silos—one haylage, the other wet corn—and two trench silos holding a total of 2,000 tons of corn silage. He feeds silage all winter and green chops corn from July to late October. Hudson and Loveless solved the even flow of silage problem by building a deep pit in which they put two boxes from self-unloading wagons. A dump truck brings the silage and dumps it into one unloading wagon (Loveless has never used the second wagon bed. It was intended for hay, but he finds it better to feed hay free choice.) The box unloads the silage evenly and regularly into a 12″ auger which is seven feet underground. The box is driven by a 3-hp electric motor through two automobile gear boxes. A second electric motor and two more gear boxes control the flow of wet corn from one sealed silo into this silage auger. A Harvestore with a bottom unloader can put haylage into the same auger. Protein supplement is augered out of a hopper into this mixture. The auger then rises from seven feet down to seven feet above ground, and runs 320 feet out, reaching four feedlots. In each lot is a 120-foot auger at right angles to the central auger. Each lot holds 300 cattle, or about 10 inches of bunk per animal.

Loveless can change the proportions of the feed by changing gears, and the system gives him a well-mixed, constant feed.

Another Hudson-engineered setup is the feedlot of Robert Dilliard of Bunker Hill, Illinois. Dilliard feeds 450 cattle a year and

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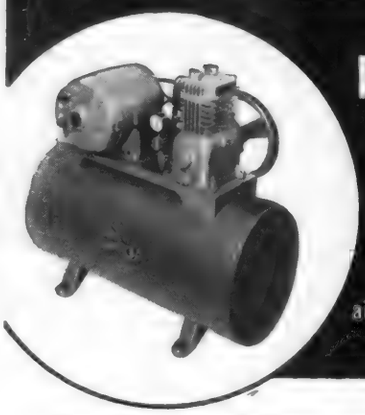

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1,100 hogs. He has two tile silos with a bunk reaching out to his feedlot from each. A reversible cross auger enables him to feed each bunk from either silo. A small orange Scru-Feed'r sits atop the cross auger and is filled by a separate auger running from a 6-ton metal supplement bin.

"I set the Scru-Feed'r to discharge the supplement in roughly the same time that the silage takes to fill the bunk," said Dilliard. "But by February my silos were empty and I started feeding corn. I still wanted to feed 500 pounds of supplement to the 258 head of cattle, so I had to speed up the meter to empty by the time a day's supply of corn had been run out. As long as I hit it roughly I didn't care. I don't think it's important to be that accurate."

Gene Wilson, with 640 acres in Rosedale, Ohio, has a two-bin Meter-Blender which straddles a 9-inch silage auger set flush in a concrete floor. Silage is augered from a top unloader to the bunks. Wilson augers wet corn from a silo into the larger of the Meter-Blender hoppers. The other hopper contains the protein supplement. Corn and protein drop on the silage and are blended as the auger rises six feet to the Blend-O-Matic tube-type feed distributor which stretches down his feedlot.

One of the advantages of having an auger set in the floor is that molasses can be fed directly from a barrel by merely setting the barrel astraddle the auger, and running in the quantity needed.

Hay Feeding

Most farmers seem to prefer to feed hay free choice, although in the Western States hay is being ground and fed in a mixed feed. In some places wafers and pellets are handled automatically, or in a self-unloading wagon. Automatic machinery for hay seems to be awaiting the development of field wafer or pelleting. Ford and International Harvester both tested experimental machines in the field so the day may soon be here when we can automatically handle the ingredients for the complete livestock ration.

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GREGOR MENDEL

(*Continued from page 76*)

disaster struck. Anton Mendel, while working under the corvee, was struck a crushing blow on the chest by a rolling log.

He continued to farm with great difficulty for the next four years, but he was unable to give help to his son. Johann assured his father he would get along on what he earned from tutoring. He did get along, stubbornly and hungrily, but he did it at the cost of his health. Upon graduation from the Gymnasium he was forced to spend a year at home recovering.

During this trying period, the crippled Anton Mendel sold his farm to his son-in-law Alois Sturm, the husband of his oldest daughter, Veronika. Payment for the farm consisted of a pension for Anton and his wife, a dowry for the youngest daughter, Theresia, and either 100 gulden for Johann should he enter the priesthood or find a way to earn a livelihood, or provide him with free quarters and a measure of arable land should he fail to make an independent living. During Johann's school years, Sturm was to pay 10 gulden for his support.

Knowing that 10 gulden would not support him through a year of school and having found out from his disastrous last years that he could not support himself while studying, Johann was confronted with a near insoluble problem.

Stubbornness, however, must have been a dominant trait in the Mendel family and they were all anxious for Johann to complete his education. His younger sister, Theresia, insisted he take her dowry and use it to go on with his studies. Reluctantly, for he knew Theresia was risking her future for him, Johann accepted. With this money and with earnings he received from tutoring, he was able to continue his studies at the Olmutz Philosophical Institute where he received an excellent grounding in mathematics from Dr. Johann Fux and took his favorite subject, physics, under the Augustinian monk, Friedrich Franz.

It was Pater Franz who suggested the possibility of his entering the Augustinian monastery when, in 1843, Mendel, again broke and sick, asked his advice. Pater Franz wrote to his friend Cyrill

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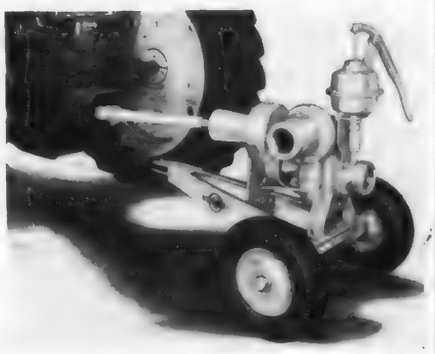

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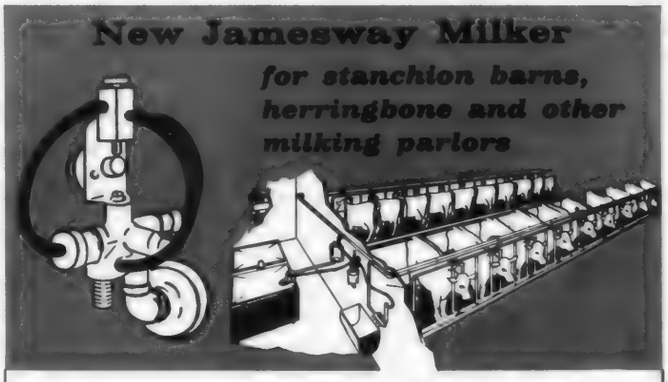

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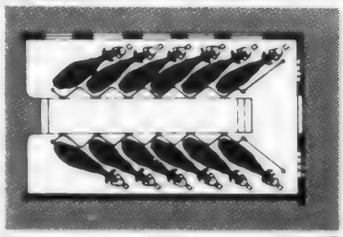

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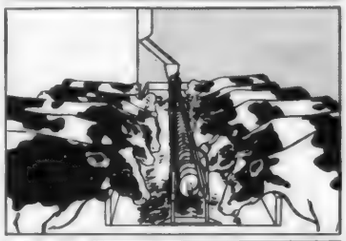

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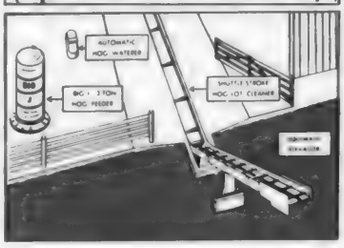

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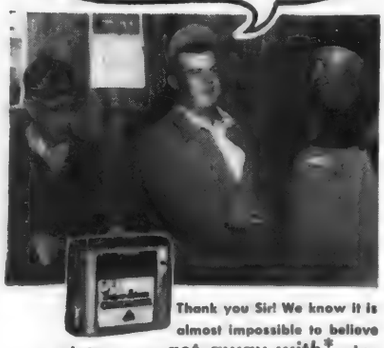

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Franz Napp, Abbot of the Augustinian monastery of St. Thomas at Brunn, the capital of Moravia, which at that time was part of Austria. It is now Brno, Czechoslovakia. His endorsement and Mendel's excellent grades were enough to gain admittance.

The Monastery under Abbot Napp, was a stimulating place for a young student. Napp himself was an outstanding scholar and vigorously encouraged the intellectual life. He had gathered to the monastery such men as Franz Bratranek, the philosopher and natural scientist who edited the scientific correspondence of Goethe; Paul Krizkovsky, the musician; and Franz Klacel, the philosopher and amateur botanist. These three had a profound influence on Mendel's life as he went through the two years of probation and his four years of theological study. Aurelius Thaler, a monk and a botanist who died three months before Mendel arrived at the monastery, also influenced the young student through the fine botanic garden and herbarium which he left.

A year before he completed his theological studies, Mendel was ordained a priest by special dispensation of the Bishop. The request was made for the convenience of the monastery which had suffered a number of losses through death, but it also showed Mendel to be an unusually good student. At his ordination, he took the name of Gregor.

As a priest, Gregor Mendel showed a side of his character which was not often seen. As with many quiet, undemonstrative people, his feelings were deeper than could be imagined. When he visited the sick or suffering, his own sympathetic feelings were so strong he became ill himself. This reaction became so serious the Abbot decided he should not continue as a parish priest and secured for Mendel the job of substitute teacher at the Znaim High School. He served as a substitute as he had not passed a teacher's examination.

Mendel was an unusually good teacher. He took joy in making mathematics and Greek understandable and even interesting to the dullest as well as the brightest of his students. The school authorities urged him to take the examination so he could be made a permanent teacher. Mendel went to Vienna and took the examination. He failed, doing poorly in zoology.

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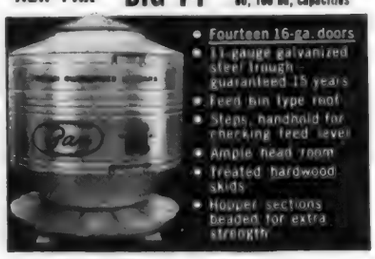

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fessor Andreas von Baumgartner, was, however, impressed with Gregor Mendel's mind and with the fact that he had not had the advantage of a university education. The Professor wrote to Prelate Napp explaining the failure and suggesting the monastery send Mendel to the university for further training. Being not only an important professor but also a baron, von Baumgartner's recommendation carried great weight and the Prelate decided to send the young priest to the University of Vienna.

Very little is known of the two-year period at the University. He studied chemistry, mathematics, zoology, botany and entomology. His favorite subject, physics, he continued under Christian Doppler — who discovered and explained the Doppler Effect in acoustics. Mendel also served as a demonstrator at the Physical Institute.

At the end of two years, Mendel returned to the monastery and in 1854 was appointed a substitute teacher at the Brunn Modern School. This job lasted for the next 14 years which were the happiest and most productive in Mendel's life.

Mendel lived at the monastery and grew fat on the wonderful food served there. His cell was cluttered with cages of mice which he used in breeding experiments. A tame fox and hives of bees he kept in the monastery garden. The Abbot assigned him a strip of garden 20 by 120 feet and a corner in the greenhouse in which to carry on his botanical experiments. Here his great work was accomplished. At the school he was the ideal teacher, stimulating, lucid and gentle. His harshest weapon in maintaining good discipline was a severe stare over the tops of his gold-rimmed glasses. In the town of Brunn he helped found the scientific society at which he later read his famous paper.

He interrupted this pleasant life once, in 1856, to go to Vienna to take the teacher's examination once more. Again he failed. He never spoke of the examination and the records were destroyed so it is not surely known why he failed. His friend Nowotny, the school inspector, believed he clashed with the examiner in botany on the subject of heredity and, rather than give in, withdrew from the examination. Because of this disagreement, so the story goes, Mendel began his great series of experiments in genetics.

Whether or not the experiments were conducted as a rebuttal to his examiners, Mendel did begin his plant breeding work at this time. His object was to discover "a generally applicable law governing the formation and development of hybrids." By hybrid, Mendel included any plant which was cross-pollinated. To discover such laws he recognized that the experiments must be "carried out to such an extent and in such a way as to make it possible to determine the number of different forms under which the offspring of hybrids appear, and to arrange these forms with certainty according to their separate generations, and to ascertain their statistical relations."

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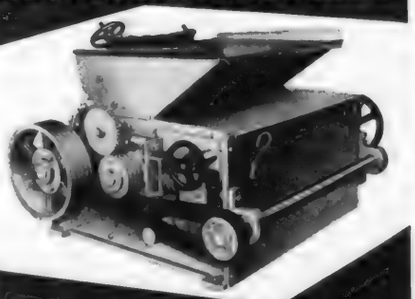

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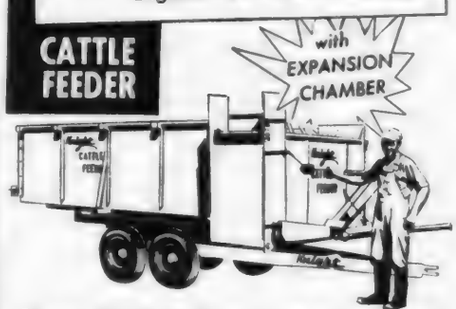

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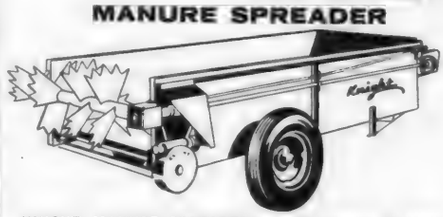

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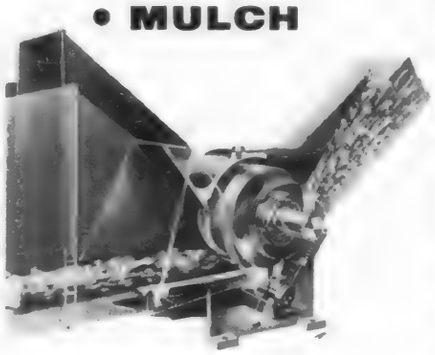

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In searching for experimental material, Mendel looked for a family of plants which could be crossed without loss of fertility, yet one whose flowers could be protected against the introduction of foreign pollen. The family must also have within it variation in character, which could be used to compare and contrast the offspring with their parents.

He decided upon the pea family and tested some 32 lines. From these he picked seven pairs to test the inheritance of the following contrasting characteristics: (1) round or wrinkled seed; (2) seed with either yellow or dark green endosperm when ripe; (3) plants with white flowers producing seeds with white coats, or plants with violet flowers and gray seedcoats; (4) seed pods which are inflated or those which are pinched in between the seeds; (5) green or yellow seed pods before the seeds are ripe; (6) flowers which are distributed along the main stem or those which are bunched at the end of the stem: and (7) tall or short vines.

Mendel's plan for this classic experiment was to make it as simple as possible by crossing the plants with these contrasting characteristics and recording the inheritance of these traits and these alone. He deliberately ignored all other changes in the offspring. Attempting to observe all of the changes, he contended, would simply give a general impression and lead nowhere.

After growing each of his experimental lines for two years to make sure the self-pollinated seed bred true, he began the painstaking task of cross-pollinating. Since the pollen normally forms before the flower opens, Mendel carefully opened the flowers in the bud stage, removed the pollen-bearing anthers and dusted the pistil with pollen from the contrasting line. To test whether inheritance must come through the male or through the female lines or was independent of such linkage, he crossed both ways—using, for example, pollen from the wrinkled pea on the round and using pollen from the round pea anthers to dust the pistil of the wrinkled pea flowers. In all he made 278 such crosses. The flowers were then protected from further pollination by little cloth bags. In late summer, he harvested the seed from these crossings, keeping each set of seeds in carefully marked containers.

The results of some of these crossings such as the shape and color of the seeds

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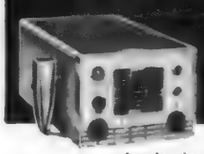

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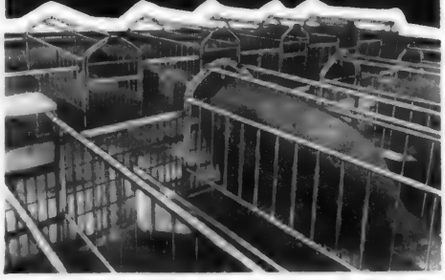

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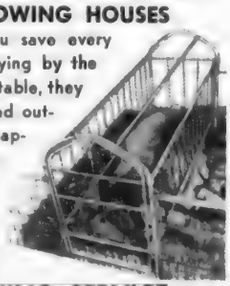

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were immediately apparent; other results such as plant size could only be determined when the seed from the cross was planted. Other botanists had observed that "in general hybrids tend to resemble one or the other of their parents." Limiting himself to the observation of a single characteristic, Mendel found that in each and every case this characteristic of the hybrid looked exactly like that of one of the parents. All of the round-wrinkled cross were round; the cotyledons of the yellow-green cross were all yellow; all seed coats were gray and the flower color was violet in the gray-white cross; all pods were inflated; the unripe pods were green; the flowers all grew along the stem; and all the plants were tall in the tall-dwarf cross. Mendel described these qualities as being *dominant* and the traits which failed to show up as being *recessive*.

In growing this hybrid seed, or F_1 as geneticists now call it (F_1 standing for 1st Filial), Mendel had allowed the flowers to self-fertilize. With these self-fertilized seeds he hoped to discover what had happened to the recessive characteristic.

Throwbacks to earlier generations had been observed before: Mendel hoped the pattern of the reappearance of the recessive might throw light on the whole problem of inheritance.

The F_2 generation showed a very significant regularity in the reappearance of the recessive. In every experiment there appeared three dominants to one recessive. There were 5,474 round seeds to 1,850 wrinkled—a ratio of 2.96 to 1; the yellow cotyledon showed in 6,022 as compared to 2,001 green—a ratio of 3.01 to 1; and so on through the entire seven tests.

Continued experiments showed always the recessive bred true and that a third of the seed showing the dominant trait produced nothing but the dominant offspring while two-thirds produced the familiar three-to-one ratio of the hybrid. From these experiments Mendel concluded that the hybrid produced not a 3:1 ratio but a 1:2:1 ratio. The seed, or plant which showed the dominant characteristic was, in actuality, a pure dominant or a hybrid. As he put it, "The dominant character can have here a double signification—that of a parental character, or a hybrid-character." This distinction between what we now call the phenotype, or the outward appearance of the offspring, and the genotype, its genetic makeup, was of the greatest importance in the development of the Mendelian theory.

While continuing the study of the single cross hybrids to make absolutely sure there was no blending or merging of the characteristics under study, Mendel began a series of more complex experiments. For the first series of these he developed plants carrying not one but two dominant characteristics and others carrying two recessives. In one such test, for example, he crossed plants with the dominant characteristics of round and yellow seeds with those having wrinkled green seeds. In a second series he produced parent plants with three dominant and three recessive characteristics. In both series of experiments the first filial generation showed nothing but the dominant characteristics. The F_2 generation separated into groupings of mathematical regularity which expressed each possible combination of the original characteristics. In still other revealing experiments he crossed his two-way hybrids back against the recessive parents—again with significantly regular, and, indeed by this time, predictable results.

From this whole series of experiments Mendel concluded that for every inherited character there is a determiner or differentiating element (we now call them genes) in the egg and in the pollen. He concluded that these elements are inherited one from each parent. In the hybrid plant the elements differ, but both elements are present even though the plant resembles the dominant parent. But what about the pollen and the eggs from the hybrid? Mendel said, "Since, in the habit of the plant, no changes are perceptible during the whole period of vegetation we must assume that it is only possible for the differentiating elements to liberate themselves from the enforced union when the fertilizing cells are developed. In the formation of these cells all existing elements participate, in an entirely free and equal arrangement, by which it is only the differentiating ones which mutually separate themselves. In this way the production would be rendered possible of as many sorts of egg and pollen cells as there are combinations possible of the formative elements."

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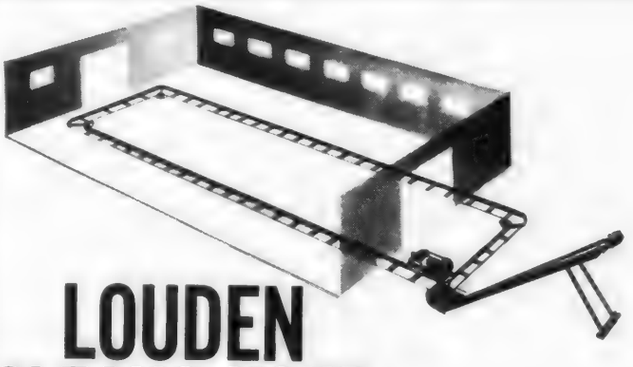

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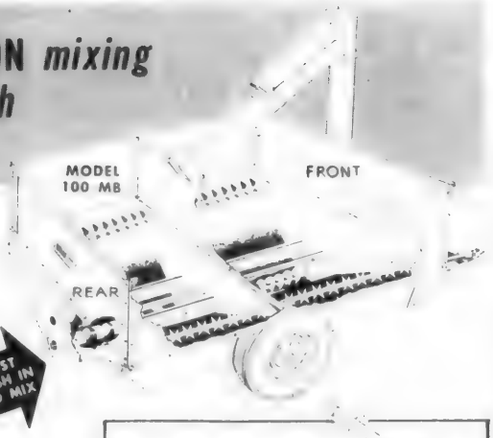

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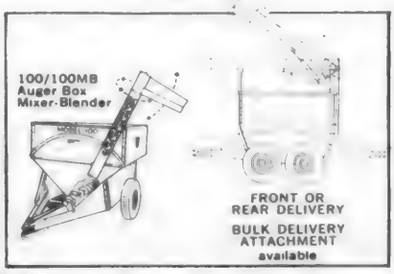

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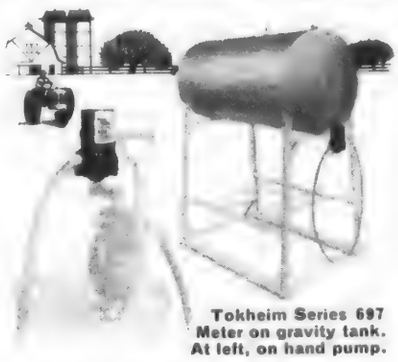

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Years later this very separation of the paired chromosomes into reproductive cells with but half as many chromosomes as the normal cell was discovered and named *meiosis*.

In developing and presenting the results of his eight years of experiments, Mendel had to use a formidable amount of mathematics. Neither the listeners at the Brunn Society for the Study of Natural Science nor the readers of the paper were prepared for the statistical approach. As he plotted on the blackboard the 27 possible combinations of the crossing of three characteristics in a self-pollinated hybrid, the eyes of the Brunn natural scientists must have slowly glazed and their minds fogged.

The same reaction was apparently universal among the men who read the paper. Hugo Iltis, who later became Mendel's biographer, read the paper as a student in 1899 in the Brunn library. He was amazed, puzzled and jarred at the strange joining of botany which he loved, with mathematics, which he disliked. He took the paper to his professor of botany who could make no more of the paper or its laws than could the puzzled Iltis.

Perhaps the only scientist of his day who would have fully appreciated Mendel's work was Charles Darwin. Darwin himself had selected the garden pea for cross-pollinating experiments and had noted the curious regularity of the F_2 generation, but had drawn no conclusions from this work. It is known that copies of the paper were sent to England, but Darwin's son has reported Mendel's work was not in his father's library.

Mendel stubbornly went on with his breeding experiments. He was, however, most unlucky in his choice of a second experimental plant. The hawkweed with its tiny flowers was most difficult to cross-pollinate. The eyestrain was so great, Mendel had to give up the work for a season. But worst of all, the plant had a peculiarity which was fatal to such an experiment. Not until years later was it discovered that the plant is capable of producing seed without pollination. This trait prevented Mendel from gathering any conclusive additional facts from these experiments. It appears likely, however, that his scientific life would have been brought to an end soon in any event As happens all too often today, the scientist became the administrator.

Little has been written of Mendel's religious life and much made of the fact that his entering the monastery solved a pressing economic need. He must have been a deeply spiritual man, however, for on March 30, 1868, his fellow monks who knew him best, elected him to be their spiritual head when Abbot Napp died.

As Abbot, Mendel had the estates of the monastery at his disposal and at first rejoiced in the land he could now use for his experimental work. He soon discovered that though he had gained space, he had lost the time to carry on the work. Administrative work and a long battle with the state

over taxation of the monastery ended his scientific work in genetics.

A glimpse of Mendel the Abbot has been preserved by C. W. Eichling, a flower and seed dealer of New Orleans, who visited the monastery in 1878 with a letter of introduction from Ernest Benary, one of the great European seed growers. Eichling recalled, "On my arrival at Brunn, I called on the only customer I had. After our business was concluded, I asked about Abbot Mendel. My customer stared at me in some astonishment and registered mild amazement at my inquiry. I was told that, while *der Herr Abt* was one of the best beloved clerics in Brunn, not a soul believed his experiments were more than a pastime, and his theories the maunderings of a charming putterer . . .

"My first impression was a genuine and pleasant surprise. My customer's account had built in my mind a picture of an old, wrinkled, spooky monk. Coming toward me was a fine looking, spectacled priest, smiling and extending a welcoming hand. His countenance expressed both determination and kindliness . . .

"I repeat here that at the time I met Mendel I knew practically nothing of his discoveries and experiments and he forbore to enlighten me on the subject. He did show me several beds of green peas in full bearing which he said he had reshaped in height as well as in type of fruit to serve his establishment to better advantage. I asked him how he did it and he replied, 'It is just a little trick, but there is a long story connected with it which would take too long to tell.'

"I told Mendel that I had promised to make a report to Benary regarding these experiments, but Mendel changed the subject."

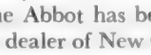
Mendel died January 6, 1884. He was mourned as a generous, kindly priest, but certainly not as one of the great scientists of the century. But Mendel had been right when he said, "My time will surely come."

As the years passed, scientists began to discover the physical transmitters of heredity and to learn of their mechanics which Mendel had correctly suggested. In 1888 Waldeyer stained the rod-shaped chromosomes and gave them their name. The curious division and separation of chromosomes in the sexual cells in which, as Mendel had described, "the differentiating elements liberate themselves from the enforced union" was observed and named mitosis. The biologist, Hertwig, actually observed the joining of male and female reproductive cells of the sea urchin.

Then, in 1900, three geneticists, each working on what he thought to be his own discovery of the laws of heredity, discovered Mendel. Hugo de Vries, the distinguished Dutch botanist, prepared a paper for the German Botanical Society in which he outlined two of the basic laws of heredity and then stated, "These two propositions were, in essentials, formulated long ago by Mendel. They fell into oblivion, however, and were misunderstood. According to my own experiments, they are generally valid . . ." This paper was published in March. In April, Carl Correns, a German scientist and, ironically enough, a student of the botanist Nageli who had rejected Mendel's ideas, wrote, "I thought that I had found something new. But then I convinced myself that the Abbot Gregor Mendel in Brunn, had, during the sixties, not only obtained the same results through extensive experiments with peas, which lasted for many years . . . but had also given exactly the same explanation, as far as that was possible in 1866." And finally in June, Erich von Tschermak, an Austrian plant breeder, learned of Mendel through Correns and de Vries as he was making the final corrections on his own paper on this subject.

The dramatic impact of the discovery and the confirmation given to Mendel's work by these three scientists removed the scales from the eyes of the scientific world. Mendel was read with understanding and was accepted as gospel. His time had surely come.

The printed word had brought about his resurrection. Mendel would have appreciated this, for, as a high school student, he had written a poem in praise of printing in which he said: "You letters, you types, fruit of my research / You are the rock foundation / On which I shall establish and upbuild / My temple for all time. / The works of the greatest of men / Which now, of use only to the few, / Crumble away into nothingness / You will keep in the light and will preserve."



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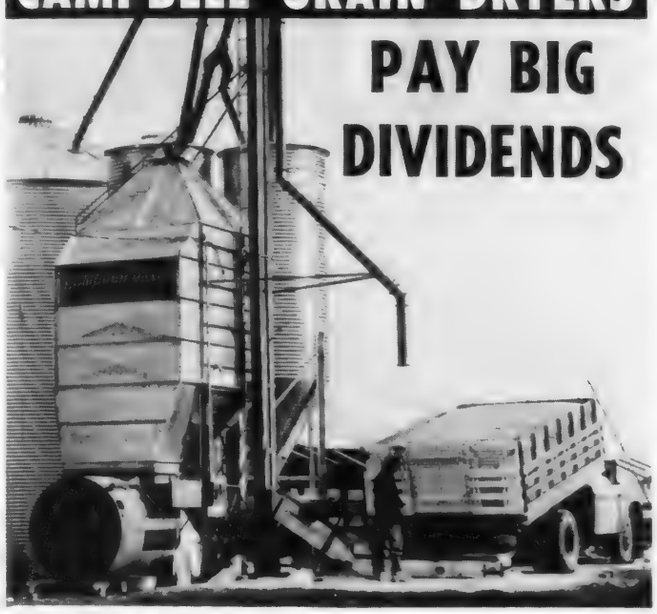

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LOW COST, LOW LOSS FARROWING HOUSE

(*Continued from page* 85)

ment is of Hines' own make. It evolved from many hours Hines spent in observing sows while farrowing. He has said, "Any farrowing crate is better than none. Sows are unpredictable. Pick up one of a sow's pigs and its squeal will rouse a terrible, slashing, grunting attack, but that same sow will plop her 400 pounds down on a pig and uncaringly allow it to squeal until it dies of crushing or suffocation. Any sow, understandably restless during farrowing, is more concerned about her own discomfort and the pig about to be farrowed than she is about those already born. Most sows get up and down many times during farrowing. That is when the greatest number of pigs are crushed. A pig has no instinct to escape. His only instinct is to eat. His first movement is toward nourishment and those movements are continuous until his hunger is satisfied and he falls asleep. All this occurs at a time when the sow is most restless and nervous and almost insensible toward the pig already born. The pigs themselves have yet to learn self-protection. Removing the pigs from the sow until farrowing is over is the obvious answer, but we just can't watch a building full of sows for 24 hours a day."

The crate Hines designed as an answer is clever, but simple in principle. It consists of a farrowing crate with an adjustable floor which can be raised about a foot off the ground. The front gate is also adjustable to accommodate different length sows —for a sow is positioned so that her rear is close against the back retaining rods.

The adjustable front gate and the raised floor are Hines' refinements. A short, smooth, inclined ramp with an open-topped box at its base completes the assembly. However, a second, small, cleated ramp is provided for temporary use at the back opening for getting the sow up onto the raised floor. Although the floor can be raised or lowered, it is far less strain on man and crate to raise the floor with the crate empty before the sow enters.

As a pig is born, it can go in one direction only—down the ramp. It slides down into the box. The high sides and the steep ramp angle prevent pigs from climbing out. A slot in the ramp effectively catches the birth membranes as they are shed. As the pigs gather in the box they nudge and squirm about which aids respiration and the removal of sac tissues. The elevated position of the sow also makes it easier to work with her if she cannot give birth unaided. "Losses during farrowing are reduced to just about zero," Dorsey Hines said. "On rare occasions, a pig will be lost because the sac is unbroken. Of course, no crate can be held responsible for stillborn pigs. This crate eliminates the need for constant watching. We look over the sows when feeding at morning and evening, of course, and a couple of times more during the day at most. It is seldom necessary to check during the

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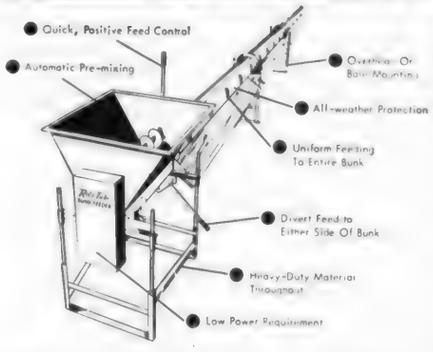

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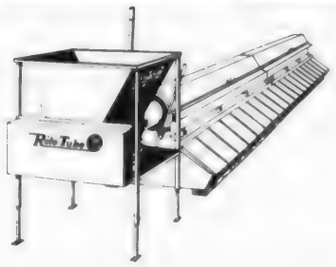

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night any more. Pigs that are born then are taken out of the boxes in the morning, if farrowing has been completed." When farrowing is over, the sow is lowered to the ground by means of an ingenious crank device and the pigs are allowed to nurse. The box and the ramp are removed, the crate becoming conventional in use.

A heat lamp is suspended from an arm over the pig box during farrowing. Later, the lamp is swung to one side for warming the pigs in the runway. "Even in the coldest weather," said Hines, "we begin raising the heat bulb when the pigs are a few days old. I have found that with the heat lamps too close, the pigs' tails dry up and slough off. Besides, I don't want hothouse pigs. I substitute an ordinary 100-watt bulb for the heat lamp as soon as reasonable."

The pigs are hardened off quickly. They remain in the crates a maximum of 10 days. From the crates, the litters go into individual houses on concrete slabs. In front of each house is an eight-foot by eight-foot solid fence, a protected runway. No heat is supplied in the most severe weather. When the pigs are about a month old, six sows and litters of like age are run together in dirt pens with individual houses. In the meantime, the sows have been on a complete pelleted ration. The same ration is available to pigs as they learn to eat. The pigs are weaned at six to eight weeks. "I go by size and condition rather than a set schedule of calendar weeks," said Hines. The weaned pigs are moved in the same six-litter batches to finishing pens where they are sheltered in 12-foot by 14-foot colony houses. In the finishing pens, they are fed pelleted supplements and shelled corn.

Cheap and Simple to Make

In recent months, Hines has begun to market a metal crate with the adjustable floor, made in a small shop set up on his farm. The cost is slightly higher than conventional farrowing crates. For several years, Hines has been selling a do-it-yourself set of plans which includes the necessary hardware for $2½.50. He estimates that the crates can be built of wood, including plans and kit, at a total cost of around $40 each if made several at a time. A simple water and feed trough to fit into each crate can be built of scrap lumber, or the front gate can be cut out to accommodate standard metal troughs. One pig box and pig ramp assembly plus a sow ramp are needed for about every four crates. The entire equipment needed to handle 30 sows at one time can be built for about $1,200. Adding about the same amount for building materials, plus a generous sum for carpentry work if it is not done by self-labor, brings the total for the farrowing house to less than $4,000.

Livestock men have pointed out that pigs should be given access to colostrum-heavy sow's milk soon after birth. Some object to the practice of allowing the pigs to remain in Hines' pig box for perhaps several hours. "We have kept pigs from nursing

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for as long as six hours after birth without noticeable ill effects," said Hines. "I certainly prefer a hungry pig to a dead one."

Others have objected to Hines' practice of keeping the sows in the crates as long as 10 days without allowing them out for exercise. "I haven't had any troubles in that regard," said Hines. "Nor do I have stiff-legged or rheumatic sows."

Jim McCutcheon, New Market, Indiana, has been producing about 1,800 hogs annually with multiple farrowings. By spreading sows' dates evenly over the month, he has been able to handle all his farrowing in only eight crates, built to Hines' design. With sows kept in the crates no longer than three days, only seven pigs per thousand have been lost by crushing in the last year and a half.

Hines puts his sows in the crates about 24 hours before farrowing is expected. It is essential, he believes, to keep accurate breeding dates. For that purpose, he used to ear-notch all sows, but since ears are often bitten up, he now uses ear tags—one in each ear for protection against loss. Each day the sows are inspected for heat and those that are "in" are exposed to a boar on two consecutive days, after which they are run with other pregnant sows. As farrowing time approaches, these sows are run through a sorting chute. The ear tags are checked for breeding dates. Those expected to farrow soon are checked for indications of imminent need of transfer to the farrowing house.

No clubs and no whips are used in driving the sows into the farrowing house or into the crates within it. Here, too, the Hines touch is evident. He surrounds the sow with a Hines Hog Walker. This consists of a lightweight four-sided, plywood enclosure, hinged at all corners. Two men carry the hog walker along a few inches above the ground, and the sow inside is easily directed wherever desired. The front swings open to let the sow out when she gets to the crate. Hines doesn't make the hog walker, but he sells the plans for a small fee. He says it saves a lot of cussing.

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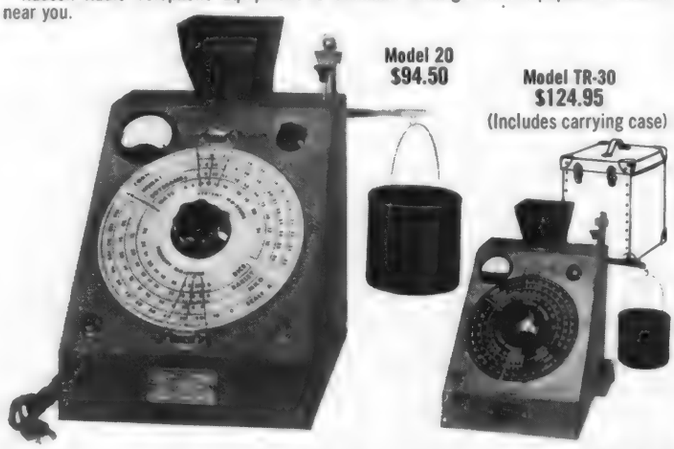

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There's a reason for the remarkable accuracy of Moisture Meters. Only Radson—among farm moisture testers—uses the elevator moisture tester principle of radio waves penetrating the grain.

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POWER SCYTHE—Mark 400
$139.50 f.o.b. factory. Includes 11" Tri-Cut Weed Blade as Standard Equipment.

Here's a new portable power clearing tool designed for many, many uses. You can cut and trim with it just about six times as fast as you can with weed-whips, swing-scythes, brush-hooks, clippers or axes. And you can even pump with it—basements, boats, etc. The Comet Power Scythe is low in first cost . . . economical in maintenance and operation cost. The engine is a Clinton 2½ h.p., 2-cycle. The unit weighs only 28 lbs. and it utilizes balanced weight positioning from a single shoulder suspension strap. Real easy to handle! You need this powerful, labor-saving equipment. Don't buy any portable power clearing equipment until you see it. Write for literature to COMET INDUSTRIES, 831 Elm Place, Richmond, Indiana.

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11" Tri-Cut Weed Blade | 10" Circular Brush Saw | Trimmer | Power Hoe | Sump-Type Pump

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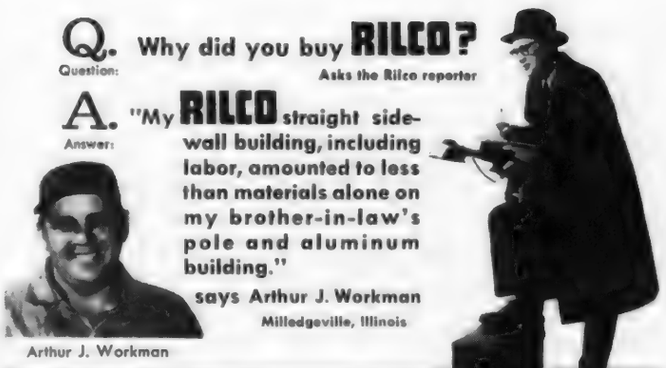
Asks the Rilco reporter

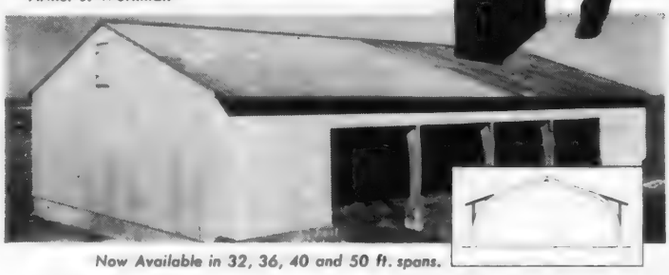
A. Answer: "My **RILCO** straight side-wall building, including labor, amounted to less than materials alone on my brother-in-law's pole and aluminum building."

says Arthur J. Workman

Milledgeville, Illinois



Arthur J. Workman



Now Available in 32, 36, 40 and 50 ft. spans.

"I'm convinced that Rilco is the only way to build," says Mr. Arthur J. Workman. "It sure is economical, and my new building has good looks, plenty of space."

You, too, can get the extra usable space you need at the price you want to pay with Rilco straight side-wall construction. In Rilco construction, pre-shaped frames made from kiln-dried selected lumber permanently bonded with waterproof glue, form a single strong unit from foundation to roof ridge. Wide spacing of frames permits large door openings on each side.

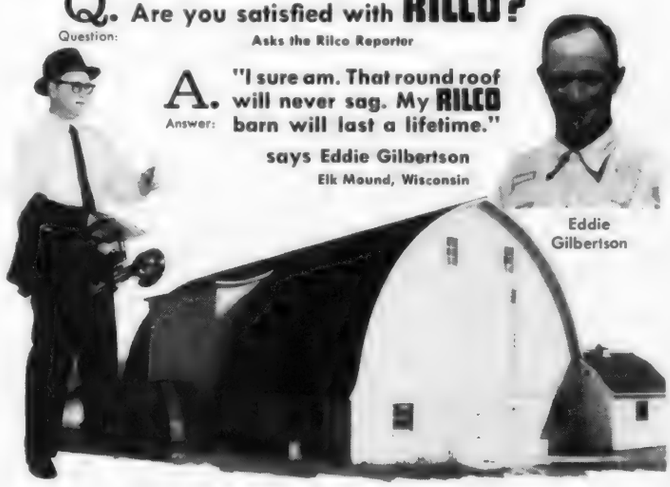
Q. Question: **Are you satisfied with RILCO?**

Asks the Rilco Reporter

A. Answer: "I sure am. That round roof will never sag. My **RILCO** barn will last a lifetime."

says Eddie Gilbertson

Elk Mound, Wisconsin



Eddie Gilbertson

"Ever since I first saw a Rilco building, I've been interested in this type of construction," says Eddie Gilbertson. "And now that I've built Rilco, I'm satisfied it's the best . . . and lowest in cost, too."

Whatever type of building you need, Rilco offers you a complete engineered framing package. Rilco rafters are shaped and drilled at the factory . . . delivered ready for erection with all connection hardware furnished. Side-door framing packages engineered to provide these convenient openings without detracting one iota from overall strength of building.

RILCO *The Engineering and Quality of Every Rilco Rafter are Guaranteed in Writing.*

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Please send information on the following farm buildings:

☐ Straight Side-wall Building ☐ Machine Sheds ☐ Hog and Poultry Houses

☐ 1 and 2 Story Barns ☐ If student, check for additional material.

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Address _____

Town _____ Zone ____ State _____

THE LAST WORD

Mechanized Fencing

This summer, United States Steel and American Steel & Wire Division will be demonstrating the latest thing in mechanization, a fence-building machine. The machine (shown below) is attached to the rear of a tractor and carries posts and wire with it. In one operation it drives posts and unreels the wire. At intervals the wire is stretched and fastened to the posts. The fencing material can be either woven wire, woven and barbed, or as many as five strands of barbed wire. It takes two men to operate. To cut fencing time still further, U. S. Steel has also come up with a new, no-twist wire splice which can clamp wires together in seconds, and corner and end assemblies which can be erected in a third of the time needed with conventional methods.

Tower Silo Haylage

"I can make haylage in a conventional silo without mold, but then, I know how," Dr. Charles F. Rogers said in "Two or More Silos" in our Spring issue. "Now I don't mean that to sound vain," he continued. "Haylage is often tried in an open silo by people who don't know how and may not be willing to take the necessary trouble to learn." Before the silage season gets under way we hasten to give Dr. Rogers' directions for doing the job:

1) Select a silo which has given you several years of service; which has doors you can seal tightly; and which is made of a material you can make into a good air and moisture barrier. Cracks in doors or around them may be sealed with crankcase oil and clay paste or linseed oilmeal and water paste—hanging plastic sheets or paper over the door is less satisfactory. Concrete silo walls may be treated with a penetrant such as 4Y1, Glaze, or Silenzcrete; wood should be treated with linseed oil; steel silos with paint.

2) Harvest clean, young meadow crops in pre-bloom stage of growth. Clean means free from trash from former crops, from soil, and from disease. By meadow crop, I mean any kind of sod pasture or hay crop that can be ensiled. Not corn or sorghum because it is impractical to wilt them.

3) Crush at moment of mowing, or immediately after. Crushing may be between smooth or corrugated rollers.

4) Windrow before the crop gets past the limp stage. Let it wilt in the windrow, until the leaves on the outside are rattle-dry.

5) Chop fairly fine—from ½ to ¾-inch. If some windrows are too dry, move over to a recently-crushed row and blend the two on one wagon load.

6) Distribute the crop while blowing it into the silo. If it sticks in the blower or on the distributor, lubricate by running a stream of water into the blower. You won't get it too wet.

7) The material must be put into the silo in layers. A layer of the wilted crop, 200 pounds per square foot of the silo cross section, should be topped with a layer of moist (70 percent) crop to a depth of 40 pounds per square foot. This gives alternate layers of approximately ten feet of wilted crop to 18 inches of the moist crop before compaction.

8) Always make the layer of moist crop the place where you stop filling—even for the lunch break.

9) When the silo is about full put on a plug of moist crop weighing at least 100 pounds per square foot—about four feet deep before compaction—and tread it down well. Then cover this topping with a plastic silage cap.

10) If showers moisten the windrow of the wilted crop, ensile it as soon as you can get into the field. The moisture is not desirable, but it does less harm than waiting for the crop to dry.

11) *Never* try to increase the dry matter by letting the crop grow older. You lose in feeding value per pound of crop and increase the risk of mold while you are feeding the haylage if you use crops that are in full bloom or older.

12) When feeding, remove haylage at the rate of at least 10 pounds per square foot per day to prevent molding.

13) *Always* use a silo that has a whole roof. Leaks may cause heating in that spot.

Making haylage in a "sealed" silo is not a difficult job. Making it in a tower silo is limited to those who are willing to take the trouble to be careful, exercise the necessary skills, and be wise in their decision either to make this kind of silage properly and use it wisely or to stick to conventional silage making.

Descent to the Summit

A grim postscript must now be added to our article "Death of an East German Farm" (Winter, 1960). With the summit conference approaching, which will take up the German question as a major topic, the Communist regime has put on terrible pressure to wipe out all private farmers and merge their farms into collectives. A friend from West Berlin writes, *I must inform you that since your visit the situation of the farmers in Central Germany has worsened to an extraordinary extent. The Communist regime is determined now to force the collectivization of agriculture. One could name many reasons which could cause Mr. Khrushchev and Mr. Ulbricht to do it. I believe that Mr. K. is especially interested in having agriculture, as well as industry, as much "socialized" as possible in order to have dead pledges for the coming conference. All the private farmers with whom you talked were forced to join a collective. The man you identified as Hans Bertram as well. There wasn't any other alternative. During the last month about 100,000 farms died. It was terrible.*

You can imagine the mood of the farmers and our feelings here in Berlin, too. We get the impression that Mr. K. in his dealings with Central Germany is continuously snubbing the Western world. It is bad that either the Western world does not see it or can do nothing against it. I wish I could talk to you personally about my grief and my despair.

MARTIN IS ON THE MOVE . . . *NOW*, YOU CAN GET NEW

1960 HARVEST HOARDER DRYING BINS

WITH ALL THESE IMPROVED FEATURES:

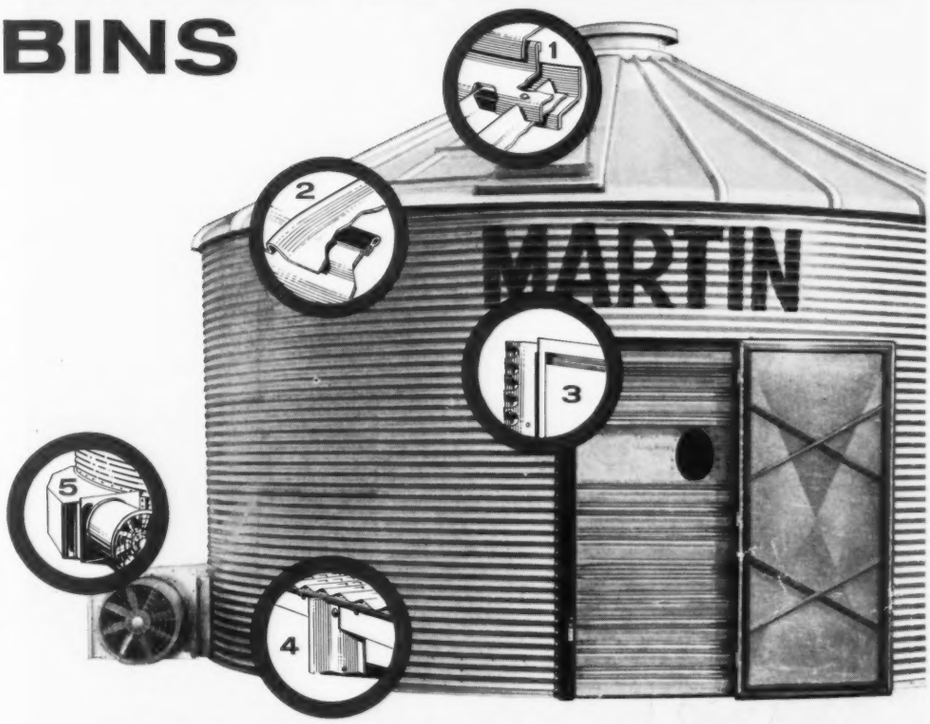
1 **Ridge collar is double sealed** against wind-driven rain and snow by means of metal flange plus a pressure-sealed gasket. Has the only "man-sized" vent opening . . . for easy access, easy filling and more aeration. Storm-proof, deep-drawn ridge cap can be opened and closed from the ground.

2 **Only pressure-sealed bin available today**—continuous, positive seal gasket where wall and roof meet keeps out the finest snow and rain. Also has sure-fit steel closures to completely seal roof ribs. No hard-to-fit rubber plugs to dry and fall out! It all adds up to **more protection against weather!**

3 **One-piece door frame** . . . heavy, welded, galvanized . . . gives maximum strength, speeds construction, prevents sagging doors. The opening is wide (37½") and extra heavy, too. Corrugated sides of frame match corrugated wall sheets for weather-seal. No filler pieces to fall out.

4 **A package drying floor**—all steel—and the only scientifically designed floor to dry corn or grains positively. Design is such that there is complete and even free-flow of air from the fan into the grain. Specially formed steel uprights and sills support all weights involved. The drying floor is galvanized for long life—a floor you can walk on without sagging or bending.

5 **Air duct** is engineered for greatest efficiency. This transition from fan to bin floor gives the smoothest flow of drying air without forming eddies of dead air or back pressure. Fan capacity matches drying capacity for profitable results. You have a choice of supplemental heaters.



FOOT-FOR-FOOT IN HEIGHT, these bins have **STRONGER WALLS.** Narrower wall sheets develop maximum strength by forming more horizontal joints to give that **EXTRA** margin of safety against excessive pressures. Gauges of sheets are only half the story. **Walls must be engineered** to withstand various types of loading and pressures.

Now, your farm can have a complete grain drying and storage system for far less than you would imagine. It's all in one package . . . the same bin dries and stores, and it's automatic. Lets you harvest early and cut field losses. Get the 1960 new Martin drying bin now . . . point for point it is best!

INCREASE GRAIN VALUES—CUT LABOR COSTS

CHOOSE A GRAIN BIN TO FIT YOUR NEEDS—25 SIZES AND CAPACITIES

This same Martin bin is also available for dry storage of all grains and shelled corn. It includes the same 1960 construction features shown above to make Martin bins the best anywhere.

Please send free literature on the following:

- ☐ Harvest Hoarder Drying Bins
- ☐ Silos
- ☐ Wet Corn Storage
- ☐ Storage Bins
- ☐ Rigid Frame Building
- ☐ Corn Cribs

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Martin's 50th Year—Research, Performance, Leadership

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The wonderful new watch that science has given farmers

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One of the reasons is *science.* When you use science as your partner, you work near-miracles on your land.

In this scientific revolution, you and your farm machines are an essential part. *You* keep abreast of new ways to get things done faster, better. *They* have the muscle to tackle today's heavier yields, substituting low-cost horsepower for expensive manpower.

New Holland machines are *science-designed* to meet these modern needs of yours. Take the advanced New Holland concept of *Hay-in-a-Day* . . . the One-Man Way. With a modern New Holland Hayliner and Bale-Thrower, you alone can now bale faster than a two-man team.

New Holland Research is in constant touch with the exciting new developments going on in colleges and experiment stations . . . designing machines to match these advances so you can get even greater productivity from your land. Remarkable new alloys, entirely new principles, are under test in laboratory and field.

Of one thing you can be sure: New Holland will remain first in the mechanization of livestock farming practices. New Holland Machine Company Division of Sperry Rand Corp., New Holland, Pa.

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